PUBLIC HEALTH INTRODUCTION



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An Introduction to Public Health

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(a work in progress)

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TABLE OF CONTENTS

Licensing

1: Core Concepts and History of Public Health

1.1: Student learning outcomes (goals) for this week

1.2: What Is Public Health?

1.3: Focus on Prevention

1.4: Public Health and Medicine

1.5: Public Health and Personal Health

1.6: Factors that Contribute to Health

1.7: Risk Factors and Protective Factors

1.8: Contrasting Models for Understanding Public Health Problems

1.8.1: The Social Ecological Model- Breast Cancer example

1.8.2: Biomedical model- Breast cancer example

1.9: Public Health Early History

1.10: Twentieth Century Public Health

1.11: Ten major accomplishments in the 20th century

1.12: Twenty-First Century Public Health

1.13: World Health

1.14: The Healthy People Initiative- 1990-2030

1.15: Additional Resources

1.16: Summary

2: Organizations of Public Health

2.1: Learning Outcomes

2.2: How Public Health Is Organized

2.3: U.S. Public Health Agencies

2.3.1: Centers for Disease Control and Prevention

2.3.2: The FDA and USDA

2.3.3: The Environmental Protection Agency

2.4: Quasi-Governmental Organizations

2.5: State and County Health Agencies

2.5.1: Organization within a public health department

2.6: Non-Profit Organizations

2.7: The World Health Organization

2.8: 2025 Reorganization of HHS

2.9: Challenges within the Public Health System

2.10: Example of Public Health Organizations Working Together

2.11: The Whole School, Whole Community, Whole Child Model

2.12: Core functions of state and local public health agencies and the 10 essential services
2.13: Public Health Involves Making Public Policy for the Public Good
2.14: Documentary- The Invisible Shield episode 1
2.15: Additional Resources

3: Social Determinants of Health

3.1: Learning Outcomes
3.2: What are "social determinants of health?"
3.3: Healthy People 2030 and the Social Determinants of Health
3.4: Ecological Model and the Social Determinants
3.5: UNNATURAL CAUSES- In Sickness and In Wealth
3.6: Social determinants have a major impact on health.
3.7: Embodiment
3.8: Inequality Itself Correlates to Worse Health
3.9: Inequality in the United States
3.10: Making Change
3.11: Actions that work toward equality and health
3.12: Making Changes to the Social Determinants Benefits Health
3.13: Change Can Happen
3.14: Supplemental Reading on Social Determinants Affecting Health Outcomes
3.14.1: Introduction
3.14.2: Economic Stability
3.14.3: Neighborhood and Built Environment
3.14.4: Educational Environment, Access, and Quality
3.14.5: Social and Community Context
3.14.6: The Cumulative Effect of Inequalities on Health
3.14.7: Chapter Summary
3.14.8: Key Terms
3.14.9: Review Questions

4: Epidemiology- The Study of Disease, Injury and Death in the Community

4.1: Learning outcomes
4.2: Epidemiology and Public Health
4.3: What Does “Evidence-Based Practice” Mean?
4.4: Public Health Responses to Epidemics
4.5: Burden of Disease and Epidemiology
4.6: Public Health Statistics
4.7: Vital Statistics
4.8: Health Disparities and Inequalities
4.9: Cases and Rates
4.10: Morbidity and Mortality
4.11: Tracking the Spread of Covid-19

4.12: Reporting Births, Deaths, Diagnoses
4.13: Secondary Data
4.14: Epidemiological Studies
4.15: Types of Population Studies
4.15.1: Observational Studies
4.15.2: Experimental Studies
4.16: Causation
4.17: Etiology and Contributory Cause
4.18: Risk Factors and Protective Factors
4.19: Health Information
4.20: Public Health and the Fight Against Misinformation
4.20.1: Internet, Social Media, and the Age of Algorithms
4.21: Is Science Even Trustworthy?
4.22: The Value of Deeper Research
4.23: Documentary- Invisible Shield, episode 2
4.24: Additional Resources
4.25: References (additional references esp. for pages by Erin Calderone)

5: The Prevention and Control of Diseases
5.1: Learning Outcomes
5.2: The Public Health Approach
5.3: Classification of Diseases
5.4: Genetic Diseases
5.5: Communicable Diseases
5.6: Types of Infectious Agents
5.7: The Chain of Infection
5.8: Modes of Transmission
5.9: Susceptible Hosts and Population Immunity
5.10: How do we Eradicate Infectious Diseases?
5.10.1: Smallpox and Polio
5.10.2: Measles, Mumps, and Rubella
5.11: Emerging and Re-emerging Infectious Diseases
5.11.1: HIV/AIDS
5.11.2: Other Sexually Transmitted Infections (STIs)
5.11.3: Viral Hepatitis
5.11.4: Influenza Viruses
5.11.5: Coronaviruses- MERS, SARS, and COVID-19
5.11.6: Monkeypox (Mpox)
5.12: Noncommunicable Diseases
5.13: Multi-Causation Models of Disease

5.14: The Multi-Causation Model and the Ecological Model
5.15: Prioritizing Prevention and Control Efforts
5.16: Prevention, Intervention, Control, and Eradication of Diseases
5.17: Levels of Prevention
5.18: Prevention of Communicable Diseases
5.19: Vaccination and how rates are changing in California
5.20: Examples of Prevention of Noncommunicable Diseases using the 3 levels of prevention
5.21: Common Noncommunicable Diseases - An Overview for Prevention
5.21.1: Cardiovascular Diseases (CVD)
5.21.1.1: Current Rates in the U.S.
5.21.1.2: Risk Factors/Protective Factors
5.21.1.3: Public Health Response
5.21.2: Diabetes
5.21.2.1: Current Rates in the U.S.
5.21.2.2: Risk Factors/Protective Factors
5.21.2.3: Public Health Response
5.21.3: Cancers
5.21.3.1: Current Rates in the U.S.
5.21.3.2: Risk Factors/Protective Factors
5.21.3.3: Public Health Response
5.21.4: Chronic Lower Respiratory Diseases
5.21.4.1: Current Rates in the U.S.
5.21.4.2: Risk Factors/Protective Factors
5.21.4.3: Public Health Response
5.22: Additional Resources
5.23: Additional References - if not cited on page itself
6: Community Organizing, Community Building, and Health Promotion
6.1: Learning Outcomes
6.2: The Community as the Client
6.3: What Is Community Organizing?
6.4: Organizing steps in a campaign for change
6.5: Required Video Case Studies
6.6: More Examples of Organizing
6.7: Environmental Justice
6.8: Why community organizing for public health?
6.9: Applying the Roles of the CHW to a Case Study
6.10: Community Intervention Models
6.11: Health Promotion Programs
6.12: How to create a health promotion program

6.13: Case Study 2- Our Choice/Nuestra Opción- The Imperial County, California, Childhood Obesity Research Demonstration Study (CA-CORD)
6.14: Lessons from Geese
6.15: Additional Resources

7: Environmental Health
7.1: Introduction
7.2: Learning Outcomes
7.3: What is environmental health
7.4: Environmental Health and the Emergence of the Modern Environmental Movement
7.5: Measuring Risk
7.6: Laws to Protect the Environment and Human Health
7.7: Clean Air
7.8: Clean Water
7.8.1: Flint Water Crisis
7.8.2: Case Study- The Jackson Water Crisis
7.9: Waste Management
7.9.1: Types of Trash/Municipal Waste
7.9.2: Recycling and Composting
7.9.3: Sanitary Landfills and Combustion
7.9.4: Hazardous Waste, RCRA and CERCLA
7.10: Food and Drug Safety
7.11: Occupational Health Concerns
7.11.1: Occupational Health Policy
7.11.2: Workplace Injuries and Illnesses
7.12: Climate Change and Environmental Health
7.13: Climate Change
7.14: The Health Effects of Climate Change
7.15: Preventing Climate Change and Adapting to Climate Change
7.16: Co-Benefits of Taking Steps to Address Climate Change
7.17: Climate Change Policy
7.17.1: The Paris Agreement
7.17.2: Climate Change Policy in California
7.17.3: Emergency preparedness (whether emergency is climate related or not)
7.18: Additional Resources
7.19: References - if not already on each page

8: Weight, weight bias, nutrition and physical activity
8.1: Learning Outcomes (goals for this module)
8.2: Obesity- A controversy
8.3: Regarding obesity, we have at least two controversies

8.4: Americans have gained weight
8.5: ONE VIEW- Obesity - the most serious health problem of our day!
8.6: Obesity - measurements and impacts
8.7: A DIFFERENT VIEW- Obesity - a manifestation of fat-phobia and a distraction from the real issues!
8.8: What causes obesity? What causes the diseases associated with obesity?
8.9: What is good nutrition?
8.9.1: Nutrition
8.9.2: Nutrition Environment and Services
8.10: Physical Activity
8.10.1: Physical Activity and Fitness
8.10.2: Physical Education and Physical Activity
8.11: Additional Resources
8.12: Additional References - partial list

9: Community Health in Diverse Racial and Ethnic Populations Communities in the US
9.1: Goals for this Module (also known as learning outcomes)
9.2: Chapter 10 in ICPH- Community and Public Health and Racial/Ethnic Populations
9.3: Race, Ethnicity, Culture, and Nationality
9.4: Cultural Groups and Formation of a Cultural Identity
9.5: The Role of Culture in Shaping Health Beliefs and Practices
9.6: Racial and Ethnic Classifications
9.7: Issues with Data and with the Classifications
9.8: Snapshots of the Health of Racial and Ethnic Groups in the US
9.9: Americans of Hispanic Origin- Health overview and leading causes of death
9.9.1: The Latino Paradox
9.9.2: Becoming American- episode of Unnatural Causes
9.10: African Americans- Health overview and leading causes of death
9.11: Asian Americans and Pacific Islanders- Health overview and leading causes of death
9.12: American Indians and Alaska Natives- Health overview and leading causes of death
9.13: Immigrant and Refugee Health
9.14: Minority Health and Health Inequities (disparities)
9.15: Health Disparities in Specific Health Conditions
9.16: Social Determinants of Health and Racial and Ethnic Disparities in Health
9.17: And now... cultural competence and cultural humility
9.18: Cultural Competency
9.19: Cultural Humility
9.20: Cultural Barriers to Care
9.21: Culturally and Linguistically Appropriate Services (CLAS) Standards
9.22: Health Inequities in the Pandemic
9.23: What does a successful response look like?
9.24: Additional Resources

10: Maternal Infant and Child Health

10.1: Learning Outcomes

10.2: MIC Indicators of Population Health

10.3: Social and Behavioral Factors in Maternal and Infant Health

10.4: Genetic Factors in Maternal and Infant Health

10.4.1: Genetic Disorders and the Ethics of Prenatal Testing

10.4.2: Epigenetics

10.5: Age and Pregnancy

10.6: Family Planning / Contraception

10.7: Abortion

10.8: Maternal Health

10.8.1: Maternal Mortality

10.8.2: Crisis in Maternal Mortality - video

10.8.3: Life Course Perspective

10.8.4: California- A Partial Success Story in Saving Mothers' Lives

10.9: Infant Health

10.9.1: Infant Mortality

10.9.2: Immunizations in Infancy and Childhood

10.10: Childhood Health

10.10.1: Leading Causes of Morbidity and Mortality

10.10.2: Health Concerns for Children

10.11: Public Health Programs for MICH

10.11.1: Social Ecological Model to Reduce LBW and Preterm Birth

Index

Glossary

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1: CORE CONCEPTS AND HISTORY OF PUBLIC HEALTH

Public health works to create positive conditions for health for everybody. When public health is effective, it's often invisible -- we notice illness, but seldom notice when people are NOT getting sick from a hazard that was prevented or mitigated by public health. Clean water? Food that's safe to eat? Vaccines? Safe working conditions? Public health plays a role in all of that!

This chapter introduces some core concepts and tools that public health uses to protect people's health. It illustrates how public health thinks about prevention and uses data to solve problems. It also provides some history of the field of public health, to give you an idea of how these public health approaches arose. The chapter also points out some commonalities and differences among public health, clinical medicine, and personal health activities.

1.1: Student learning outcomes (goals) for this week

1.2: What Is Public Health?

1.3: Focus on Prevention

1.4: Public Health and Medicine

1.5: Public Health and Personal Health

1.6: Factors that Contribute to Health

1.7: Risk Factors and Protective Factors

1.8: Contrasting Models for Understanding Public Health Problems

1.8.1: The Social Ecological Model- Breast Cancer example

1.8.2: Biomedical model- Breast cancer example

1.9: Public Health Early History

1.10: Twentieth Century Public Health

1.11: Ten major accomplishments in the 20th century

1.12: Twenty-First Century Public Health

1.13: World Health

1.14: The Healthy People Initiative- 1990-2030

1.15: Additional Resources

1.16: Summary

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1.1: Student learning outcomes (goals) for this week

After completing this chapter, readers (learners) will be able to

1. Define health (in particular, the WHO definition) and discuss what is meant by the terms "public health," "community health," and "population health."
2. Differentiate between the roles of public health and medicine.
3. Differentiate between a focus on personal health and a focus on public health.
4. List and discuss factors that influence a community's health.
5. Define the terms "risk factor" and "protective factor" and give examples of each.
6. Draw the ecological model, describe each of the 4 levels, and relate it to factors that commonly affect health.
7. Discuss how public health has evolved over time to focus on evolving threats to health, using both science and community action.
8. Describe some key phases in the history of public health, and how the primary focus of public health institutions changed in each phase.
9. Describe the purpose and goals of the Healthy People 2030 project as a plan for the nation's health.

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1.2: What Is Public Health?

Public health encompasses a number of different scientific disciplines, jobs and practices, all united by their commitment to improving the health of the public. Public health practitioners - whether they are health educators or water quality monitors, food policy advocates or infectious disease specialists - focus on the health and well-being of the community as a whole. They study how disease and injury affect populations as a whole, and they work to prevent disease and injury on a large scale. In fact, **prevention** is probably the most important word in the public health lexicon.

> **Public health is the science and art of preventing disease, prolonging life, and promoting health -- through the organized efforts and informed choices of society, organizations,, communities, and individuals.**

A frequently-cited definition of public health (written in 1920 by public health pioneer C.E.A. Winslow) is **"the science and art of preventing disease, prolonging life, and promoting health through the organized efforts and informed choices of society, organizations public and private, communities, and individuals."** Societal and community actions, in particular, are central to the mission of public health. The phrase "informed choices" refers to the importance of data and research to making good policies and programs for health. The phrase "organizations public and private" means that both governmental and nongovernmental organizations play a part. To put Winslow's ideas into more modern language, the American Public Health Association (APHA) offers another definition of public health: "**Public health promotes and protects the health of all people and their communities. This science-based, evidence-backed field strives to give everyone a safe place to live, learn, work and play."**

So what is health?

The World Health Organization's definition of health states that "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."

- What strikes you about this definition? How is it similar or different from a definition of heath you would have written yourself?
- Why do you think the WHO includes physical, mental and social forms of well-being?

It is this broad definition of health that guides the work of public health departments and agencies - and it also informs the content of this course. Public health works to support health and well-being, at many levels of society.

The work of public health is everywhere, yet sometimes invisible. Since you got up this morning, what you have you encountered that might reflect the work of public health? Clean water? Safe food? Public transportation? What else?

Video

This video from Crash Course offers an excellent overview of public health. (Crash Course is an educational publisher in the United Kingdom.) As you watch this video, take a few notes.

- What stands out to you as core concepts or principles in public health?
- What kinds of actions do public health workers carry out?
- What are the differences you notice between personal health and public health? Or between public health and clinical medicine?
- Why does public health matter? Where do you think public health has had an impact on your own life?
- Anything you find surprising about public health?

YouTube Video

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

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Check your understanding:

(Q: ADD back in these short questions? H5P or how?)

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1.3: Focus on Prevention

The Public Health "Upstream" Story:

Every profession has its particular stories and myths. If you work in public service in the U.S., you probably have heard the story about George Washington not telling a lie after chopping down the cherry tree. If you work in public health, you've probably heard the "upstream" story. Here's my version of the story.



One day, a person is walking by a river and they see a baby floating in the river. Quickly, she jumps in to pull the baby out of the river. No sooner does she save one baby, than she sees another baby coming along in the river too. She pulls that one out, and soon sees another baby, and another one. She calls to a man on the river bank to come help her, and he jumps in the river to help pull the babies out of the river. Still more babies are coming down the river, so they call to another person on the bank to come help. This person comes close enough to see what is happening, then takes off running. The woman and the man in the river call to him, "Hey, where are you going?" He answers, "I'm going upstream to see how these babies are falling into the river."

Public health workers often see themselves as the ones running upstream to identify the causes of the problems we face. Can you imagine why this might be a useful metaphor for public health work?

Prevention is the primary focus of public health.

Preventing an illness or an injury before it starts is the "gold standard" for public health.

You will hear or see the terms "downstream" and "upstream" frequently in public health readings. "Upstream" generally refers to more "primary prevention," addressing the root causes of the problem or preventing an illness (or injury) before it starts. "Downstream" refers to working closer to the effects of a problem - helping those who are harmed by a health issue, or dealing with the consequences of an illness (or injury) so nothing worse occurs. Of course, there is a continuum between "upstream" and "downstream" - many places along the river where we can intervene.

For example, if the health issue is heart disease (the #1 cause of death in the United States), a "downstream" approach might be to offer rehabilitation exercises to people who have already had one heart attack, to try to prevent a second one. An "upstream" approach might include a policy to limit tobacco use in public, as tobacco often leads to heart disease, or to increase time spent in gym class in schools so that children develop the habit of being active from an early age.

Reflection: *What are some examples you can think of to improve health in your community in an "upstream" way?*

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1.4: Public Health and Medicine

Public health and clinical medicine are both important to health. They work together for greater impact. However, they each have a distinct focus and set of tools. Most of us are familiar with medicine, having spent time in a clinic or hospital at some point. Far fewer people have ever visited a public health agency. Let's explore some of the differences and similarities between public health and medicine.

There is a parallel between the distinction "upstream" / "downstream" and the distinction "public health" / "medicine."

This is also talked about sometimes as the difference between the bio-medical approach, and the systems-approach. In general, public health is focused on systems and **prevention** (upstream) and medicine is focused on individual bodies and **treatment** (downstream).

The following chart compares the two disciplines:

Public Health	Medicine
Primary focus is prevention Focuses on populations Diffuse set of professions, not well-known Care for the whole community is primary	Primary focus is treatment and cure Focuses on individual patients Well-defined profession, well-known Care for the whole patient is primary

Both disciplines are essential to health, of course.

- In the middle of a heart attack, I want a doctor, not a public health worker!
- To prevent a heart attack, I'm happy that public health workers have reduced my exposure to second-hand smoke and unhealthy ingredients in food, and continue to remind me to get more exercise.
- In many areas, public health and medicine work together -- for example, in ensuring that the population receives needed vaccines.
- Some individuals work in BOTH fields at once. There are doctors and nurses employed in public health agencies, and there are community health workers and other public health advocates who work in clinics.
- In addition, *preventative medicine* is a growing focus for doctors and other healthcare providers who use medicine to prevent disease, not just treat it. They still focus on treatment of the individual -- not on population health -- yet share with public health a focus on prevention.

Two Models: Biomedical and Social Ecological

Later in this chapter, you will see a contrast of two models or ways of thinking about health problems. One is more aligned with medicine and its strengths -- the biomedical model. The other is more aligned with public health and its strengths -- the social ecological model. Both models rely heavily on evidence drawn from science, both share a focus on prevention, yet the biomedical model also incorporates treatment and a stronger focus on individual health outcomes, rather than population health.

Costa Rica: Full integration of Public Health and Medicine

Costa Rica, a relatively poor country, can boast of a life expectancy greater than the US life expectancy. They have lower rates of many diseases than their neighboring countries. One key to this success is the full integration of public health with their system for delivering primary care (the first level of medical care) to all their residents. The same team of doctor, nurse, and community health workers who treat a person's diabetes also survey the community for health risks like bad water and follow up with all residents needing vaccines. Even at the national level, the system that oversees hospitals and clinics is merged with the national public health agency (their CDC). This deep integration of prevention and treatment has produced remarkable results!

If you want to learn more about this, the following brief video summarizes one study of Costa Rica's success in

integration of prevention and treatment through their primary care system, resulting in longer and healthier lives:

YouTube Video

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View this YouTube Video online

In the United States, most state and federal dollars spent on health go toward medical care, not public health, yet public health often provides a greater impact for the money -- as they say, an ounce of prevention is worth a pound of cure. That's just one reason why it's important for more people to understand the work of public health!

Try out this activity to check your understanding:

Are these examples of public health or medicine? (Or could some of them be both?)

Screening for high blood pressure

Treating cancer

Installing speed bumps in a neighborhood to slow traffic

Building affordable housing

Promoting the eating of more fruits and vegetables

Vaccination

Teaching kindergarten students about brushing and flossing their teeth

Setting a broken leg in a cast

Providing condoms for free

References

Citation: article from the New Yorker (fix format)

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1.5: Public Health and Personal Health

Similar to the distinction between public health and medicine, there is also an important **distinction between public health and personal health**.

Personal health and wellness is an approach that centers the individual and the different actions a person can take to improve their health and the health of their family. The emphasis is on personal responsibility for health.

Public health, as we have noted, focuses on population health and those actions that are most likely to improve the health of many or all people. The emphasis is on looking out for one another's health across the community.

Both types of actions can play a vital role in prevention, and both forms of responsibility are important values in the United States. Most of the health advice we come across day-to-day focuses on personal health -- eat better, move more, wear a seatbelt. Public health often plays a role in the background to make those healthy choices more possible -- for example, inspecting restaurants and meatpacking plants to ensure that food is safe to eat, promoting farmers markets and SNAP benefits, building sidewalks and parks, monitoring the air for contaminants, and establishing safety standards for cars.

Here are some examples of **personal health activities** and **community and public health activities**.

Personal health activities:

- Choosing salad instead of french fries.
- Increasing the variety in one's diet.
- Going for a walk.
- Dancing with friends.
- Playing a sport or going to the gym.
- Getting enough sleep.
- Practicing meditation or some other means of reducing stress.
- Reading a book aloud to a child.
- Brushing and flossing one's teeth.
- Selecting one's preferred form of contraception.

Community and public health activities:

- Health fair.
- Monitoring the rates of disease (like in a measles outbreak).
- Installing speed bumps to slow traffic.
- Community gardens and farmers markets.
- Drop-in hypertension clinic to expand access to screening and care.
- Safer sex outreach events.
- Supporting corner stores to offer more fresh food.
- Billboards and other advertisements about the dangers of vaping.
- Banning smoking indoors in public places.

Note: In this book, we often talk about community health and public health interchangeably -- expanding opportunities for health to a larger population. "Community health" emphasizes the community aspect, like offering health services in a certain neighborhood, or developing activities for a specific community within the larger population. At the local level, public health agencies and community health services usually work closely together.



The scale of change matters

In public health, we sometimes say that there's a difference between what determines the health of individuals versus the health of populations. For example, if we remove soda from vending machines in schools, that alone isn't going to make an individual healthy -- the impact of skipping or delaying drinking a soda at school is relatively small for the individual. However, if the vending machine change leads to students overall drinking 15% less soda per year, that can have a big effect on rates of metabolic disorders like diabetes in the population.

Sometimes a *small change* at the population level has a *large effect,* even if it doesn't sound like much when you see it through the lens of personal health. If in a population, average blood pressure goes up by 10 points, that means an increase in thousands of cases of hypertension -- even though for any individual, their blood pressure reading can change vary day to day. A small change that affects a lot of people (population health) can be quite important.

It's similar to the difference between weather and climate. If the **weather** shifts and the temperature in San Francisco goes up 3 degrees Celsius (about 5 or 6 degrees Farenheit), that just means the fog burned off -- it doesn't mean much at all. But if the **climate** changes, and the average temperature on Planet Earth goes up 3 degrees Celsius, that's HUGE-- entire nations could be under water, droughts and wildfires would be widespread, and tropical fruit might grow in Canada.

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1.6: Factors that Contribute to Health

Diverse factors contribute to a person's health. Each of these can have an impact on the level of an individual's **personal health** or more broadly on a **population's health**. Five major factors that affect or determine health include genetics, healthcare, health behaviors, environment, and social conditions.

Most people assume healthcare is the most important factor -- and of course, healthcare is vital! But most research has shown that social conditions and health behaviors actually influence health *the most*. It's important to note that none of these five factors operates in isolation -- they influence one another, together shaping human health.



Social Conditions

Social conditions have an enormous -- if often overlooked -- impact on human health. By social (and economic) conditions, we mean everything that affects where we live, work and grow. The following list of social conditions gives a flavor of how broad this category can be:

- Education
- Job status
- Neighborhood quality
- Income
- Family support networks
- Political voice
- Housing availability and quality
- Community organizations

Social conditions can have a strong influence on a person's stress levels, as well as their health behaviors. Social conditions can affect a person's access to healthcare and their environmental exposures. In this sense, social conditions isn't just *one* factor in shaping health, it is an underlying influence on nearly all the factors.

Social conditions are explored further in a later chapter on the **social determinants of health**.

Health Behaviors

Health behaviors can be approached either through the lens of personal health or public health.

When thinking about personal health behaviors, you might ask questions like, do you sleep enough? do you drink enough water? how is your diet? how much physical activity do you fit into your week? what is your relationship to substance use?

When public health focuses on health behaviors, it conducts research and implements changes through programs or policies.

- **Programs** -- organized activities that promote health, for example, an asthma education group for parents of kids with asthma at the YMCA, or a national program like WIC that provides good nutrition to birthing parents and their children.
- **Policies** -- rules, regulations, and laws, like banning smoking tobacco in restaurants or requiring the use of seatbelts in cars.

Even small changes can make a difference. As an individual, eating vegetables, walking often, and avoiding tobacco can all help reduce your personal risk of cancer, for example. Public health changes -- for instance, a policy to reduce the cost of fresh fruits and vegetables -- can make it easier for people to adopt healthier behaviors.

Healthcare

Having timely medical care can play a big role in treating illnesses and injuries, reducing the length of illness, and preventing things from getting worse. Two key aspects of healthcare that affect health are access and quality.

- **Access to healthcare**
  - Is medical care available?
  - Is it convenient in terms of location and hours?
  - Is it affordable? (This usually includes looking at health insurance, which is covered in a later chapter.)
- **Quality of healthcare**
  - Is the medical care of high quality?
  - Is it provided in a way that connects well with the patient (for example, in a culturally appropriate way)?
  - Is it comprehensive?

Genetics

One of the biggest influences on a person's health is their **genetics**. Some illnesses are caused by a specific gene -- for example, sickle cell anemia, a very painful disorder that is prevalent among people of African descent and other populations who trace their ancestry to places where malaria was endemic in the past. Other illnesses aren't *caused* by a gene, per se, but someone's genetic makeup can make them more vulnerable to it. This it true of some cancers, for example, and even of some behavioral health problems, such as addiction or bipolar disorder.

For a long time, genes were seen as "set in stone" -- but scientific advancements in genetic testing, genetic counseling, and even gene therapies have begun to change that perception. New medical treatments have been developed that can mitigate, and in some cases even cure, genetic diseases like sickle cell.

Another way that genes can be seen as more changeable than previously thought is through their interaction with the environment. Different exposures in the physical and social environment -- whether that's a chemical in the air or a traumatic experience in early childhood -- can, in effect, turn some genes on and off. The science of **epigenetics** examines how this happens. While the genes themselves do not change based on environment, how they behave in the body CAN change.

Environment

Environmental exposures in air, water, and soil have a large impact on human health. These exposures can come in the form of biological risks (microbes or infectious agents), chemical risks, and radiation. Environmental factors also include the weather and even the number of hours of sunlight in a given location. A later chapter in this book examines **environmental health** in some detail.

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1.7: Risk Factors and Protective Factors

Risk factors

Risk factors are traits, behaviors or conditions that increase the probability of disease, injury, or death. (They usually occur BEFORE the disease or injury starts, or perhaps they occur DURING it. But risk factors are different from health consequences or health effects which come AFTER the disease or injury. So, for example, a high-sugar diet is a risk factor for diabetes, while blindness can be a health consequence of diabetes.

Risk factors and protective factors may be connected to any of the five factors or areas we saw previously -- genetics (or other biological traits), health behaviors, social conditions, healthcare access and quality, or environment.

A **risk factor** is not always a true *cause* of disease -- for example, living in the West of the US is a risk factor for suicide compared to the East, but geography is not a cause of suicide. For something to be considered truly a root cause of disease, the scientific evidence showing that causal relationship has to be strong (like the evidence we have linking tobacco to cancer). Eliminating the root cause of a disease (for example, removing asbestos from schools) is an excellent form of prevention. Regardless of whether the root cause of a disease can be eliminated, understanding the risk factors and protective factors helps focus public health efforts on the groups, activities or situations most commonly associated with the disease.

Protective factors

Protective factors are the opposite of risk factors. They are traits, behaviors or conditions that decrease the chance of developing a disease or injury. For example, eating a lot of fruits and vegetables reduces a person's likelihood of developing cancer. It's not a guarantee -- some people who eat their veggies still get cancer -- but it is less likely to happen.

Protective factors help us identify things that build resilience for individuals and groups. They help us see the *positive actions* we can take -- as individuals and families, as well as in our communities -- to promote health.

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1.8: CONTRASTING MODELS FOR UNDERSTANDING PUBLIC HEALTH PROBLEMS

As discussed in the previous section, finding out what causes negative health outcomes and how to change these outcomes is a complicated process. Fortunately, there are different models that we can use when we try to understand and solve health problems. These models provide a framework with which public health professionals can identify different points at which to intervene in order to prevent diseases and improve health outcomes.

The **Biomedical Model** addresses health issues "as a function of risk factors, symptoms, diagnoses, and treatments." (Acolin & Fishman, 2023) A doctor using the biomedical model might ask you about your symptoms and health-history, order different lab tests for you and ultimately make a diagnosis. This model attempts to identify a *causal* relationship between risk factors and diseases, ultimately to identify treatments and solutions. The biomedical model can also be used in public health. For example, we might identify that the leading cause of death for Americans is heart disease. Scientific literature identifies that one of the major risk factors for heart disease is obesity. Therefore, we might design education for individuals on weight management, create clinical weight-loss programs, research weight-loss medication, or even develop policies (such as getting government funds to pay for specific obesity-prevention programs, or requiring labels on high-calorie foods).

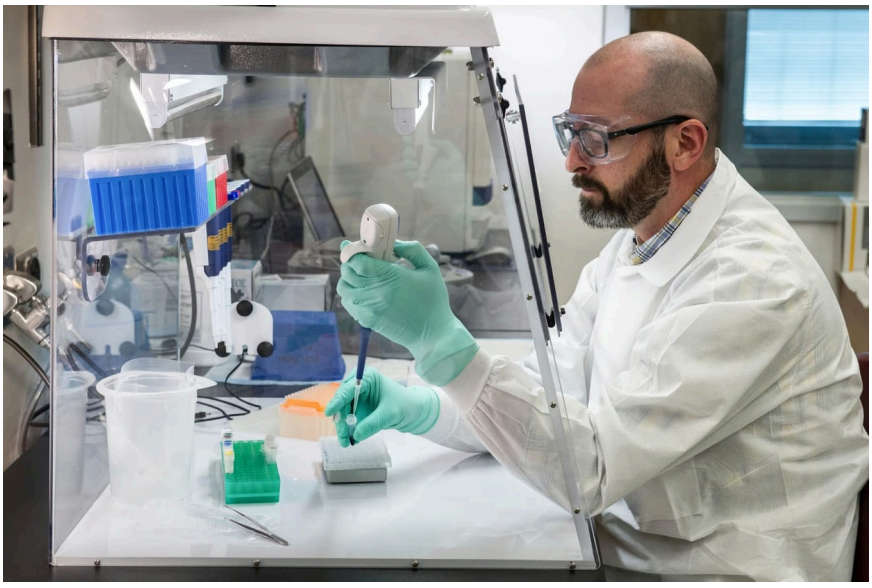


Figure 1.8.1: (*Photo by **Freerange Public Domain Archives** from **Freerange Stock***)

The **Social Ecological Model** identifies health outcomes as influenced by "the interaction between the individual, the group/community, and the physical, social, and political environments" (Clinical and Translational Science Awards (CTSA) Consortium's Community Engagement Key Function Committee 1997/2011). This could be illustrated by nutritional habits. What we eat on a daily basis is often our familiar foods, perhaps those we grew up enjoying, or can be influenced by close relationships such as friends, roommates or a significant other. In this way, the individual's behaviors are influenced by their close relationships - what they were fed as a child growing up, what they tend to eat-out with friends, or what their significant other eats. These are all influenced by the community in which they live - which could be their geographical location but also includes cultural, and/or religious norms. In turn, this community food is also influenced by the society at large: what food is grown, produced and sold in that region, what is affordable and accessible, etc. Using the social-ecological model, a public health practitioner might attempt to address policies to prevent obesity, like banning sugar-sweetened beverages of a specific size. Or they might address access to fruits and vegetables by coordinating a public-private partnership to put a grocery store in a neighborhood that doesn't have one, in order to change that community's access to health-promoting foods. Perhaps a healthy cooking class might be offered at a community center - thus hopefully having a positive effect on the individual's nutritional knowledge and skill, and also on the nutritional habits of the attendee's families. The diagram in Figure 1.8.2 was developed by the CDC in 2007, and is used to visually represent the social-ecological model.

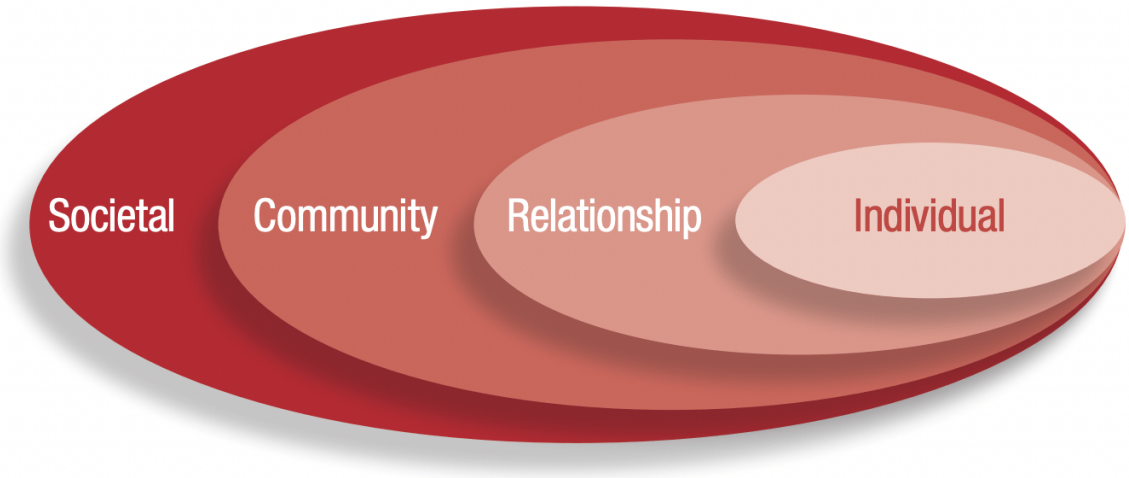


Figure 1.8.2: The Social Ecological Model - A Framework for Prevention

1.8.1: The Social Ecological Model- Breast Cancer example

1.8.2: Biomedical model- Breast cancer example

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1.8.1: The Social Ecological Model- Breast Cancer example

The Social Ecological Model (also called the Ecological Model, or Eco Model for short) demonstrates the interaction of factors that increase the risk of disease at four levels: individual (or intrapersonal); relationship (or interpersonal); community; and society (or societal). Some versions of the social ecological model include other layers, such as into "institutions" and "neighborhoods" (which could be understood to be part of the "community" level).

Risk factors interact across the different levels. For example, a lack of grocery stores in a neighborhood can influence the food behaviors of families and individuals. That's why the model is usually drawn as overlapping circles, not just a list of factors in each category. The Societal level is the biggest circle because it generally has the largest effect.



Figure 1.8.1.1: Social Ecological Model. (Public domain, Centers for Disease Control and Prevention [CDC])

In the example below, we focus on breast cancer, a disease. However, the social ecological model also works for understanding injuries and health-harming conditions. You could use this model to examine risk factors for suicide, or the roots of homelessness, for example.

Social Ecological Model: Breast Cancer

- **At the individual level**, we look at physical, demographic, and behavioral aspects of a person's life.
  - Genetics can increase a person's risk of breast cancer, as can other biological factors like the age at which one enters puberty or gives birth (if at all).
  - Some behaviors can have an effect on a person's risk for breast cancer, such as diet.
  - Some factors are in a person's control (to some extent), while others are not. For example, simply being female puts a person at greater risk of getting breast cancer, compared to being male. Yet not all females get breast cancer, and some males do.
- **At the relationship level,** we look for characteristics of the family and friends that might put a person at more or less risk of a disease.
  - For breast cancer, we might consider risk factors like the family's eating and exercise habits, the family's attitudes about preventative medical care or screening, the amount of stress in relationships (which may have an indirect role in susceptibility to cancer).
  - After a cancer diagnosis, the amount of social support there is to sustain the patient (from friends and family) during treatment and afterwards has an impact on recovery -- social support, therefore, is a protective factor we might aim to increase.
- **At the community level**, we look at characteristics of the neighborhood and the local institutions and organizations in that neighborhood.
  - Exposure to certain forms of pollution can put a person at risk of breast cancer.
  - Living in a neighborhood where it is difficult to obtain fresh fruits and vegetables creates risk. In this case, the community situation affects family and individual behaviors
- **At the society level,** we are interested in the *policies* (laws and regulations) and the *societal norms* (common attitudes and expectations) that may affect the risk of disease.
  - In the United States, for example, we know that African American women are less likely to survive breast cancer, even though White women are more likely to be diagnosed with breast cancer in the first place. One explanation is that something in the social policies of the United States that increases the risk for African American women of receiving a diagnosis late, when the cancer may be more difficult to treat, or receiving worse treatment for the disease.

- Another example: the laws regarding pollution are determined at a societal level, and they may impact the risk of breast cancer and the distribution of that risk across the population.

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1.8.2: Biomedical model- Breast cancer example

The Biomedical Model addresses health issues as a function of risk factors, symptoms, diagnoses, and treatments. As we discussed earlier, medicine tends to focus more on the individual than on populations, and that is also true of the biomedical model. It also tends to focus more on downstream interventions than upstream interventions. Yet both the biomedical model and the social ecological model share a focus on risk factors -- *both models work together* to identify the populations most at risk for a specific disease or injury and to take preventative action to reduce exposure to risk factors. For example, medical researchers and doctors' associations played a role alongside public health agencies and community activists in banning or limiting transfats in food, once it was proven how harmful they are to health (Amico, et al., 2021).

Example: Breast Cancer

To prevent, detect, and treat breast cancer using the Biomedical Model, here are some actions that public health, medical practitioners, and biomedical researchers might take.

Risk Factors:

- Individual risk factors like age, sex, family history, genetic markers, and pregnancy history are used to identify those individuals who would benefit from screening. While the American Cancer Society recommends mammograms for all women starting at age 45, some women or others with substantial breast tissue may benefit from screening earlier, based on risk factors (ACS, 2025).
- Outreach efforts to encourage individuals at risk of breast cancer to get a mammogram are an example of prevention activities under the biomedical model.

Symptoms:

- Symptoms of breast cancer include lumps, swelling in the breast or lymph glands, unusual discharge, nipple changes, and unusual pain. Individuals who note these symptoms can consult their medical provider. Also, patients are often screened for these symptoms during routine medical appointments (check-ups).

Diagnoses:

- When breast cancer is diagnosed, the type, stage, and outlook for that specific form of breast cancer will be established through a series of medical tests. The treatment plan will be developed in response to the specific diagnosis.
- Substantial biomedical research has been done both in the laboratory and with patients to refine diagnoses and develop the appropriate treatments for each.

Treatments:

- Medical treatments may include radiation, chemotherapy, hormone therapy, surgery, and immunotherapies.
- Many patients also access some form of complementary or alternative medicine treatments, such as acupuncture, herbs, or meditation.
- Once breast cancer is cured or in remission, additional medical treatments may be used to reduce the likelihood of a recurrence of the disease.

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1.9: Public Health Early History

Both the discipline of public health and our understanding of disease have changed a lot over time. From the earliest civilizations, people have sought to prevent and treat disease in one way or another. Some of the practices that may have once been cultural practices -- for example, separating the sick from the well, or performing ablutions (ceremonial cleansings and hand washing) -- now have scientific explanations for how they may prevent the transmission of infectious diseases. Other approaches that once were common -- such as using leeches to bleed a sick person -- have been replaced, as we understand more about health and illness.

> Note
>
> Want to know more about the history of public health? This chapter in *Public Health 101* offers a more detailed review of public health highlights, from early civilizations forward to the 21st century.

18th Century

The 18th century (the 1700's) saw the start of the industrial revolution, the growth of cities, and the expansion of trade and travel. Some of that "travel" was involuntary -- the trans-Atlantic slave trade brought thousands of West Africans to the Americas, from the 1600's to the early 1800's, with important consequences we still live with today. Other waves of migration were motivated by the search for a better life, with more economic opportunity or political freedom.

Important public health approaches in this time include

- The collection of population data -- the first **census** in the US -- was conducted in 1790. Population data is a key tool for public health.
- **Quarantine** -- including the quarantine of boats that carried infected crew or passengers -- was one common approach to containing disease in this period. (Quarantine began to be used centuries earlier as a way to separate people who might be infected with a disease for a time in order to see if they actually are sick, before allowing them contact with the broader population. Those who were sick were then put in **isolation** until they either got better or died.) The Marine Hospital Service established in 1798 was one of the first centralized public health institutions in the US. It was set up to deal with disease on ships.
- **Variolation** -- already used in several parts of Africa and Asia -- began to be used to increase immunity and stem the spread of disease in North America. See the box below.

While most histories of public health have a Eurocentric bias, we know there were important public health advances in other societies and continents. In New England, we have documentation of the enslaved African Onesimus teaching Cotton Mather (an influential colonist and slave owner) how to perform **variolation** around 1716 to prevent deaths from smallpox. Variolation was an important precursor to **vaccination**. Using variolation, pus from a small pox blister is used to infect a healthy person under supervision of a physician -- that is, the healthy person is deliberately infected (which does not happen in vaccination). The person often acquired a milder case of smallpox and with it, immunity to reinfection. Some people, however, died from smallpox acquired through variolation. Still, the population impact of increased immunity helped stem the epidemic. Cotton Mather went on to promote the practice and to document variolation use in several parts of Asia and Africa, long before it was known in Europe or North America. How or if Onesimus ever benefited from the increasing use of his variolation technique is unknown, and unlikely. He did, however, purchase his freedom from Mather later in life, at least in part. Sources: Philadelphia College of Physicians and History Channel. Variolation is no longer used today.

Development of Vaccines

Vaccines are different from variolation in that **they do not cause a case of the disease they are designed to prevent**. The first vaccine was developed as a protection against smallpox in 1796, by Dr. Edward Jenner in England. To develop the vaccine against smallpox, a very deadly disease, Jenner used cowpox, a far less dangerous disease. You can see in this short cartoon the basics of what Jenner discovered -- how he took what everyone could observe (that people who got cowpox tended to not get smallpox) and made it into something that could be used on a large scale. Vaccines continue to be fundamental tools for public

health today.

19th Century

The 19th century (the 1800's) brought more **movements of populations** -- and again, not always voluntary. While in England, the "commons" where farmers grazed their animals were fenced off and privatized, many people were forced into factory work. Throughout the Americas, slavery (and the sharecropping and other mechanisms that followed) was the engine of both economic growth and cruel inequalities. The conquest of Native American nations by the US was brutal. We can see many **health inequalities** took root in this historical period -- Native Americans now have the shortest life expectancy of any racial/ethnic group in the U.S. Poverty, poor working conditions, crowded housing and other health hazards were something that many Americans of all races and ethnicities faced in this period. Gender inequality was beginning to be challenged by an emerging women's rights movement, and the abolitionist movement along with slave rebellions took on the work of dismantling slavery. The mid-1800's was a time of great ferment, both in public health and social movements, and the social justice roots of public health work took hold in this time period.

The **miasma theory** that was popular in the 19th century suggested that bad vapors, or bad smells common to the poor areas of town (due to crowded housing, no sewers, no refrigeration, etc.), were the cause of disease. People did not yet know about germs. The miasma theory was wrong -- and yet, there are some commonalities between the theory of miasma and analysis now, in the 21st century, of how poor living conditions affect health. The difference is that now we can focus scientifically on how social conditions affect people's health (e.g., a lack of grocery stores in some neighbhorhoods makes it hard to buy healthy food to eat). We don't blame it on bad smells or "bad vapors" in the air!

Even though people did not yet understand **germ theory** in the 19th century -- they did not know that viruses, bacteria and other microorganisms cause infectious diseases -- one of the most iconic public health actions to stop the spread of disease happened in 1854 in London. **John Snow** mapped cases of cholera, a deadly disease, and saw that they were common among people who drank water from the Broad Street Pump. When he broke the handle off the pump, he stopped or slowed the spread of the disease -- he took an *upstream* approach to stopping disease at its source. Please watch this 2-minute captioned video below that explains what John Snow did -- and ask yourself, how is this still relevant today? How can we use this same kind of logic to address new epidemics? (The video ends with a little teaser, encouraging the viewer to enroll in a longer video course to learn more -- that's not necessary.)

Around the same time in the US, **Lemuel Shattuck** prepared the first broad public health report for the Commonwealth of Massachusetts. This marks the start of the modern era of public health. Scientific advances in biology -- in particular, **the discovery that a disease can be caused by a specific germ** -- changed the way people looked at disease. No longer was disease seen as a consequence of poor morals or smelly neighborhoods -- public health began to focus on germs -- and so the **bacteriological period of public health** began. The discoveries by Louis Pasteur, Robert Koch and others helped us understand how infectious (communicable) diseases work.

W.E.B. DuBois, the African American scholar, intellectual, publisher and advocate whose work bridged the 19th and 20th centuries, also made significant contributions to the field of social epidemiology -- contributions that are only recently gaining recognition. His work to survey, map, document and visualize (through graphs, charts and other means) the health condition of the African American community in Philadelphia was among the first research in North America to explore racial health inequities. You could even say that he developed some of the first infographics, and he is still inspiring people to use visualization to discuss and advocate against racial inequities.

Let's see how you are doing so far. Answer the following questions:

In the 17th and 18th centuries, everyone understood that diseases were caused by germs.

○ True ○ False Submit

Why did Dr. Jenner inject the boy with cowpox?

○ a. To get even with the boy for stealing milk. ○ b. To test whether exposure to the cowpox vaccine would give the boy some immunity to smallpox. ○ c. So that he would get sick with smallpox and Jenner could test a cure for that disease. ○ d. To stop the spread of cholera. Submit

References

Sources: Philadelphia College of Physicians and History Channel.

Seabert, Mckenzie, Pinger (2022).

add the videos and other links on this page?

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1.10: Twentieth Century Public Health

In the 20th century, public health grew through several distinct phases (Seabert, McKenzie, & Pinzer, 2022). The focus of public health departments and laws expanded from an initial phase of expanding healthcare infrastructure, to expanding access to healthcare through public insurance programs and other social benefits, to addressing health behaviors and healthy environments, reaching beyond healthcare.

- **Health Resources Development Period (1900 to 1960)**
  - Training more doctors, nurses and health professionals
  - Building more hospitals and clinics
  - Developing the basic resources for health
- **Period of Social Engineering (1960-1973)**
  - Major health programs thru public policy like Medicare and Medicaid
  - The "war on poverty" and other social programs and benefits
  - Ensuring that more people have access to healthcare, Head Start, and other services
- **Period of Health Promotion (1974-Present)**
  - Addressing rising chronic disease through changing health behaviors
  - Promoting healthy environments (physical and social environments)
  - Addressing the roots of poor health

The tabbed content below summarizes key aspects of this period

Roll over the tabs to view more information.

Health Resources Development Period (1900-1960)	Social Engineering (1960-1973)	Health Promotion (1974-present)

Health Resources Development Period (1900-1960)



Because of the growth of health care facilities and providers (doctors, nurses, etc.) in this period, the first 60 years of the 20th century are called the "health resources development period." The early part of this period in particular (1900-1920, the Reform Phase) was also marked by many social advances with large impacts on health. For example, this period saw changes in occupational health, union organizing, immigration, and women's right to vote. As a response to the Great Depression, the Social Security Act of 1935 marked the beginning of the federal government's major involvement in social issues, including health. This law supported health facilities and public health programs. The Centers for Disease Control (CDC) began in the 1940's. After WWII, the Hill-Burton Act led to new hospital construction and attention to expanding access to healthcare across the country. The development of the polio vaccine and the heart attack of President Eisenhower further drew attention to the role of public health in prevention. In Geneva, Switzerland, the World Health Organization (WHO) was also established shortly after WWII, alongside the launch of the United Nations.

Social Engineering (1960-1973)

 The federal government became more active in health matters in the 1960's and 1970's, with the establishment of Medicaid and Medicare in 1965. The picture shows then-President Lyndon Johnson signing the Medicaid and Medicare law, with former President Harry Truman by his side. Like the Affordable Care Act today, this law was very controversial when it was signed, but became popular and expanded coverage to reach most of the elderly and many of the poor living in the US. As the ICPH textbook notes, healthcare costs grew rapidly after this law came into place -- although there were many factors that influenced that increase in costs, not only the involvement of the federal government. Many countries that had greater government involvement in healthcare did not experience the same rise in healthcare costs.

Health Promotion (1974-present)



Because expanding access to doctors and hospitals wasn't enough to improve the public's health, starting in the mid-1970's public health began to focus on health promotion. The first Healthy People report came out in 1979. Public health departments began to focus more seriously on changing health behaviors (smoking tobacco, eating poorly, etc.). Increasingly, there is a recognition that behavior change is not only about educating the public, but also changing the conditions that people live in -- so public health went after the tobacco companies, not only individual smokers. Similar approaches are now used to reduce consumption of sugary drinks and to make it easier for people to fit physical activity into their day. The National Prevention Strategy (see Figure 1.9 and discussion on pp. 18-19) recognizes this complex approach to promoting the public's health.

Changes in Life Expectancy



Life expectancy at the start of the 20th century was under 50 years of age -- and by the end of the century was approaching 80. Early deaths among vulnerable populations such as children and women in childbirth declined. Would you be surprised to know that less than 25% of the increase in life expectancy is due to medical advancements -- even though antibiotics and heart surgeries and other medical innovations have been important? Most of the gain in life expectancy is due to public health measures -- basic things like clean water and safer working conditions, as well as population-based interventions like vaccinations.

Look at the list of public health achievements in Box 1.1 (page 4 of ICPH -- a summary from the CDC's list).

- Which key accomplishments in the 20th century (the 1900's) stand out for you?
- Which ones are familiar and which ones are surprising?
- Which ones seem most important?
- What might be missing from the list?

Since 2014, the US has seen a new decline in life expectancy -- after decades of life expectancy increasing, then leveling off. This decline -- like the gains in early decades -- has more to do with public health conditions than changes in medicine. Some of the reasons for the decline include rising drug overdoses, rising suicide rates, and increases in diabetes and other chronic conditions associated with poor diet and physical inactivity. Deepening inequality in the US adds to the problem. If you are interested in reading more about the decline in life expectancy, this optional article from Our World In Data is rather good. Since 2020, Covid-19 has been a major cause of shortened life expectancy. However, the effect is not nearly as dramatic as the Influenza Epidemic of 1918 was -- look at that big dip in life expectancy in the chart above! The 1918 Influenza was both more deadly than Covid-19, and it tended to kill younger people instead of older people -- so its impact on life expectancy was extreme.

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1.11: Ten major accomplishments in the 20th century

As we have noted above, the work of public health is often unnoticed, especially when it is successful. With this in mind, in 1999 the CDC's weekly publication *MMWR* issued a list of 10 major public health accomplishments in the 20th century, a list that is still commonly used to illustrate public health's impacts. In most of these areas, we have continued to see improvements in the first part of the 21st century (e.g., further decline in motor vehicle deaths in the US, decline in deaths from coronary heart disease and stroke), while other areas have proven to be more challenging (e.g., maternal mortality, which has seen some increases in recent decades).

The text below is quoted from the CDC directly, with minor changes.

Ten Great Public Health Achievements -- United States, 1900-1999

- Vaccination
- Motor-vehicle safety
- Safer workplaces
- Control of infectious diseases
- Decline in deaths from coronary heart disease and stroke
- Safer and healthier foods
- Healthier mothers and babies
- Family planning
- Fluoridation of drinking water
- Recognition of tobacco use as a health hazard

> **Questions for reflection**: What do you think of this list? Would you normally think of each of these as "public health accomplishments"? Anything that surprised you? Anything important left off the list that you would add? Anything you might leave off a list of great accomplishments?

The CDC (1999) provides a brief example for each of these accomplishments over the course of the 20th century, as well as a more comprehensive report for each (comprising 10 issues of the *MMWR* in total).

1. **Vaccination** has resulted in the eradication of smallpox; elimination of poliomyelitis in the Americas; and control of measles, rubella, tetanus, diphtheria, Haemophilus influenzae type b, and other infectious diseases in the United States and other parts of the world.
2. Improvements in **motor-vehicle safety** have resulted from engineering efforts to make both vehicles and highways safer and from successful efforts to change personal behavior (e.g., increased use of safety belts, child safety seats, and motorcycle helmets and decreased drinking and driving). These efforts have contributed to large reductions in motor-vehicle-related deaths.
3. **Work-related health problems**, such as coal workers' pneumoconiosis (black lung), and silicosis -- common at the beginning of the century -- have come under better control. Severe injuries and deaths related to mining, manufacturing, construction, and transportation also have decreased; since 1980, safer workplaces have resulted in a reduction of approximately 40% in the rate of fatal occupational injuries.
4. **Control of infectious diseases** has resulted from clean water and improved sanitation. Infections such as typhoid and cholera transmitted by contaminated water, a major cause of illness and death early in the 20th century, have been reduced dramatically by improved sanitation. In addition, the discovery of antimicrobial therapy has been critical to successful public health efforts to control infections such as tuberculosis and sexually transmitted diseases (STDs).
5. **Decline in deaths from coronary heart disease and stroke** have resulted from risk-factor modification, such as smoking cessation and blood pressure control coupled with improved access to early detection and better treatment. Since 1972, death rates for coronary heart disease have decreased 51% (4).
6. Since 1900, **safer and healthier foods** have resulted from decreases in microbial contamination and increases in nutritional content. Identifying essential micronutrients and establishing food-fortification programs have almost eliminated major

nutritional deficiency diseases such as rickets, goiter, and pellagra in the United States.

7. **Healthier mothers and babies** have resulted from better hygiene and nutrition, availability of antibiotics, greater access to health care, and technologic advances in maternal and neonatal medicine. Since 1900, infant mortality has decreased 90%, and maternal mortality has decreased 99% (comparing 1999 to 1900).
8. **Access to family planning and contraceptive services** has altered social and economic roles of women and other people with uteri. Family planning has provided health benefits such as smaller family size and longer interval between the birth of children; increased opportunities for preconceptional counseling and screening; fewer infant, child, and maternal deaths; and the use of barrier contraceptives to prevent pregnancy and transmission of human immunodeficiency virus and other STDs.
9. **Fluoridation of drinking water** began in 1945 and in 1999 reaches an estimated 144 million persons in the United States. Fluoridation safely and inexpensively benefits both children and adults by effectively preventing tooth decay, regardless of socioeconomic status or access to care. Fluoridation has played an important role in the reductions in tooth decay (40%-70% in children) and of tooth loss in adults (40%-60%).
10. **Recognition of tobacco use as a health hazard** and subsequent public health anti-smoking campaigns have resulted in changes in social norms to prevent initiation of tobacco use, promote cessation of use, and reduce exposure to environmental tobacco smoke. Since the 1964 Surgeon General's report on the health risks of smoking, the prevalence of smoking among adults has decreased, and millions of smoking-related deaths have been prevented.

References:

CDC. (1999). Ten Great Public Health Achievements -- United States, 1900-1999. https://www.cdc.gov/mmwr/preview/mmw...l/00056796.htm

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1.12: Twenty-First Century Public Health

In the 21st century (the 2000's), we have a complex understanding of health problems at the population level.

- Some of these have to do with **healthcare** --- access, quality, cost, and fairness.
- Others have to do with how we live, where we live and what we do. Some public health professionals refer to this as "lifestyle diseases," which places the focus on **health behaviors**. Certainly, health behaviors have a huge influence on our health -- but what influences our health behaviors?
- Other public health professionals place more emphasis on the **social determinants of health,** meaning the social, economic and political conditions that influence how we live and what we do. Chapter 3 of this book explores this topic more in depth.
- We also face **environmental problems** -- everything from industrial pollution to food safety to climate change.
- We have seen emerging epidemics of **infectious diseases**, from H1N1 influenza to Zika virus to covid to possibly avian influenza in the future, should it become more transmissible person-to-person.
- **Mental health problems and substance abuse** are also major challenges today. Debilitating health conditions and deaths related to alcohol, drugs, depression and suicide are of great concern around the country.

The disparities or inequities in health that exist today -- some decreasing and others increasing -- draw our attention to how much work we still have to do to reach the ideal of **health for all** embodied in the World Health Organization's definition of health.

Public Health Achievements in the first part of the 21st Century

In the first quarter of the 21st century, great emphasis has been placed on improving health metrics (how we measure health), addressing the social determinants of health, improving health behaviors, integrating health into public policy (e.g., California's Health in All Policies initiative), and improving access and quality of healthcare. These priorities are reflected in the Healthy People initiatives.

And significant successes were achieved! For example, in 2011, the CDC celebrated key achievements of the first decade of the 21st century, including

- Vaccines to prevent disease, including improvements to the pneumonia vaccine and the launch of the rotavirus vaccine. More recently, vaccines have been developed to prevent HPV, covid, and other diseases, preventing illness and death.
- Control of infectious diseases, including large reductions in tuberculosis (over 30% drop in the US in the first decade of this century) and in certain hospital-acquired infections.
- Tobacco control, as use of cigarettes has continued to decline. We will discuss tobacco control more in Chapter __.
- Improvements in infant health such as a 36% reduction in neural tube defects, largely through ensuring pregnant individuals are getting enough folic acid, as cereals and other foods are now fortified with this important vitamin.
- Motor vehicle safety changes leading to lower rates of injury and death for drivers, passengers, and pedestrians.
- Cardiovascular disease prevention -- while heart disease and stroke are still leading causes of death, the rates have continued to decline, largely due to reduced tobacco use and improved medical treatments.
- Occupational safety guidelines and regulations have resulted in significantly lower rates of injury on the job for farmworkers, fishermen, hospital workers, and others.
- Improved screening techniques for cancer has meant earlier detection and treatment, reducing deaths from certain cancers.
- Reductions in childhood lead poisoning have been achieved, with lasting impacts on child health and learning. In 1980, 88% of children ages 1 to 5 had elevated blood lead levels; that number came down to under 1% by 2008.
- Improved public health preparedness and response. Disasters including the 9/11 attacks, the subsequent distribution of anthrax through the mail, and the devastation of Hurricane Katrina lead to more investment in public health preparedness and response. While this preparedness has been sorely tested by both natural disasters and the largest epidemic in 100 years (covid-19), the response to the 2009 H1N1 influenza pandemic was rapid and effective, preventing thousands of hospitalizations and deaths.

Federal Reorganization and Downsizing of Public Health

In 2025, a major shift in federal priorities in public health occurred under the second Trump Administration. As this chapter is being written, federal public health funding and infrastructure is being decimated, and it is likely that deep cuts to Medicaid will

also curtail access to healthcare for many. These federal changes have ripple effects on state and local health departments, as well as on the healthcare system and the nongovernmental organizations involved in public health. The impact of such deep cuts and reorganization cannot yet be measured, but are likely to be severe.

To quote "Your Local Epidemiologist" public health blogger Dr. Katelyn Jetalina,

> "There's no question that health institutions can be run more efficiently. I spent the last three years inside the CDC pushing for change—fighting for innovation, better systems, and clearer communication. I agree with some cuts and reorganization. Reimagining public health is essential. But tearing it down with no plan to rebuild isn't transformation. It's sabotage.
>
> "The ultimate justification for these cuts is cost savings. But these cuts do not make financial sense. Federal workers make up less than 1% of the HHS budget. And, public health programs are all about prevention—which is not only good for our health but can be much cheaper than treating disease. For every $1 spent on flu vaccines for the elderly, $60 are saved. For every $1 spent in NIH funding, $4.25 is added to the local economies. Cutting these programs may save a dollar today, but when people start to get sick because of eliminated programs, we'll pay many times more in health care costs down the road, much out of the government's pocket for Medicare. We're borrowing from our future selves with far too high an interest rate: in dollars, in health, and in lives."

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https://archive.cdc.gov/www_cdc_gov/...ievements.html

https://theconversation.com/massive-...-policy-253316

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1.13: World Health

The U.S. is not separate from the rest of the world, and while in this book we don't spend a lot of time on world health, health problems do not respect borders, and ideally, neither does our compassion or concern for health equity.

One review of pressing global health issues, conducted at the end of 2022 by the Institute of Health Metrics and Evaluation at the University of Washington (Seattle) highlighted eleven key challenges to watch:

- Long covid, with its unknown effects on different biological systems and on population rates of disability.
- Mental health, as a leading cause of disability and loss of quality of life worldwide
- Climate change, with effects on air quality, drought, heat injuries, infectious disease distribution, and natural disasters
- Cardiovascular diseases, now responsible for more than one quarter of all deaths worldwide
- Lower respiratory infections, especially influenza
- Poverty's role in health -- considering both the gaps between rich countries and poor countries, and between rich and poor within any country
- Health systems strengthening -- especially given the strain on health systems experienced during the most acute phases of the covid pandemic
- Diabetes, a preventable and treatable disease that still causes immense loss of quality of life
- Road injuries, the leading cause of death for people 15-49 worldwide
- Dementia, both expanding treatment and addressing the risk factors in order to reduce its prevalence
- Aging populations, as an increasing proportion of the world's population is over 65 and that trend is likely to continue

I would add to that four classic issues of global health:

- Communicable diseases, including emerging infections
- Poor sanitation and unsafe drinking water
- Hunger
- Impacts of migration

What connections do you see between each of these issues and our health here in the U.S.? What public health efforts are you aware of to, to respond to these challenges around the world?

World Health Organization

This video from the World Health Organization gives a snapshot of how international health organizations work to build the pillars of public health -- the conditions, services and actions that promote health for all. As you watch this, ask yourself, how do these actions relate to what you have already learned in this chapter about the priorities and tools of public health?

YouTube Video

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It's Not All Bad News!

Despite covid, climate change, and other concerns, there is some good news too, when we look at health in the 21st century. Take a moment to watch this 4-minute video that highlights advancements in global health, in particular, **how quickly life expectancy grew** (people got healthier) after most countries gained independence from colonialism in the mid-20th century. I am quite fond of the videos of the late Hans Rosling and his organization GapMinder, as he provided an amusing way to visualize health data

while challenging out-dated ideas about the "developing world". No one country or region has a monopoly on excellence in public health!

The 4-minute video below is *optional* - but quite interesting!

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1.14: The Healthy People Initiative- 1990-2030

The Healthy People Initiative began in 1979 due to another landmark surgeon general report titled: “Healthy People: The Surgeon General’s Report on Health Promotion and Disease Prevention” (Office of Disease Prevention and Health Promotion, n.d.-b) Each decade, the initiative sets targets for improving different areas of public health, and measures these outcomes to see if those targets have been hit. The overarching goals have changed over the years, but most have included decreasing or eliminating health disparities, and promoting health for all across the lifespan. The latest iteration - Healthy People 2030 - emphasizes the social determinants of health, including: economic stability, education access and quality, healthcare access and quality, neighborhood and built environment, and social and community context (more on these in Chapter 8). There is also a new focus in the 2030 objectives of health literacy - the ability to find, understand and use information to make well-informed health decisions. An emphasis is also placed on the responsibility of health organizations to provide equitable access to health information and support its use in individual decision-making. The Healthy People 2030 website offers descriptions and the latest data on each health-related objective. (Office of Disease Prevention and Health Promotion, n.d.-c).

> **Healthy People 2030** is a **blueprint** for how to drastically improve health in the US, along with measurable objectives to focus our efforts. The Healthy People 2030 **goals** serve as a horizon to walk towards, while the **objectives** serve as milestones, letting us know whether we are on track. Reports and meetings that share **"evidence-based practices"** -- proven strategies for health improvement -- allow public health workers to learn from others' experiences and improve health faster.

Healthy People 2030

Please view this brief video from the U.S. Department of Health and Human Services for an overview of the **Healthy People 2030 goals**:

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View this YouTube Video online

The **Healthy People 2030** plan (sometimes abbreviated to HP2030) includes a vision, a mission statement, foundational principles, five overarching goals (see video above), a plan of action, and 355 science-based objectives spread over 62 topic areas (ODPHP, n.d.-a).

The objectives describe measurable outcomes that are attainable in a 10-year period. For example, while a goal of HP2030 is that people attain healthy, thriving lives and well-being free of preventable disease, disability, injury, and premature death, one example of a specific objective that moves us in that direction is Objective MICH-01, reduce the rate of fetal deaths at 20 or more weeks of gestation. The baseline was 5.9 fetal deaths at 20+ weeks of gestation per 1,000 live births in 2017, and the objective set in the plan was to reach a rate of 5.6 (or lower). This objective is an example of public health success -- the lower rate of 5.6 was attained in 2021 -- and now efforts are focused on lowering it further. Healthy People 2030 is not only a plan, written once a decade, but also a system for tracking progress toward the objectives set out in the plan. It is easy to see, for example, on this page about pregnancy and childbirth where health is improving, staying the same, or getting worse, in relation to the different measurable objectives.

The developers of Healthy People 2030 have created a set of Tools for Action to support state and local public health departments, as well as independent community organizations, to use the HP2030 objectives in setting their priorities and implementing proven strategies for health. For example, local health departments can

- Use the objectives to identify specific needs and the priority populations in their county
- Set their own targets, using the national data combined with local data, for specific health improvements in their county
- Find inspiration and practical tools by learning about successful programs, policies, interventions, and resources that can be adapted to their county
- Monitor national progress and data, to compare local successes or struggles and work for improvement

Take a moment to explore the Healthy People 2030 website.

- What *stands out* for you in the Vision and the five Overarching Goals of Healthy People 2030?
- Browse the Objectives by Topic Area -- pick one that interests you (for example, Addiction, or Chronic Pain, or Violence Prevention). What do you notice about the *measurable objectives* related to this topic? Are they broader or more narrow that you would have expected? Do you see progress in this area, or not so much?
- What do you imagine are the roles for both *medicine* and *public health* in attaining the goals and objectives of HP2030? Are some of the topic areas more suited to public health or to medicine, or would they require public health and medicine to work together?
- What are some similarities and differences between setting *public health* goals and plans, on one hand, and setting *personal health* goals and plans, on the other?
- What professions do you think must be involved in implementing HP2030? Thinking of your own professional goals, do you see a way your career might intersect with HP2030 efforts?

Other Plans for the Nation's Health

The Healthy People 2030 plan and project offers overarching guidance for improving health in the United States. But it is not the only national planning effort for health.

Here are a few examples of other national plans for health (CDC, 2024):

- **National Prevention Strategy.** Established in 2011 through the Affordable Care Act, the National Prevention Strategy helped to coordinate efforts among different agencies and organizations to reduce substance use (including tobacco), increase active living and healthy eating, improve mental and emotional well-being, reduce violence and injuries, and improve reproductive and sexual health. For a quick summary of the National Prevention Strategy, see this PDF from NACCHO, the National Association of County and City Health Officers.
- **National AIDS Strategy, 2022-2025.** This plan is the latest of a series of national strategies against HIV/AIDS, a disease that has claimed over 50,000 American lives and is highly preventable. Like HP2030, the National AIDS Strategy breaks down overarching goals to measurable objectives, such as reducing new infections by 75% or getting 95% of people with a new HIV diagnosis into treatment within one month.
- **National Plan to Reduce Alzheimer's Disease**. This plan, in existence since 2011, aims to coordinate and strengthen research into Alzheimer's disease, improve diagnosis and treatments, reduce health disparities related to Alzheimer's, and coordinate with international health bodies (like the WHO) to address Alzheimer's around the world. With an aging population, this is increasingly important.

Other national plans for different health topics and concerns can be found at the CDC page on national health initiatives. Please note, this page is being written in April 2025; some federal webpages related to health, especially those related to health equity, may be disabled or removed by the time you read this.

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1.15: Additional Resources

If you would like to explore key ideas from this chapter more, you may want to consult the following (optional) resources.

Please note, some links to external resources may have expired.

"What Is Public Health" offers an overview of public health's main functions and approaches.

YouTube Video

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"This Is Public Health" offers a fun way to look at public health. Students in New York City put stickers on items in public places that relate to public health and discuss the breadth of public health efforts.

YouTube Video

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What Is Health Equity? This short video (3 minutes) produced at San Francisco State University gives a concise answer:

YouTube Video

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- 1.16: Summary by Janey Skinner is licensed CC BY-NC-SA 4.0.

1.16: Summary

In this Lesson, we have discussed

- the definition of "health" from the World Health Organization
- Definitions of "Public Health"
- Public health's focus on prevention and on populations, including how it differs from medicine
- Public health history, from the 1700's to the start of the 21st century, including some key discoveries and the focus or emphasis of different periods
- Key accomplishments of public health and goals for the future (including the Healthy People 2030 framework)
- Factors that affect public and community health
- The Ecological Model as one way to visualize the different levels at which factors can affect health

Study Tip

The learning outcomes at the start of each Chapter are great to review after reading to check your understanding, or when preparing for exams. If you turn each statement listed in the learning outcomes into a question, could you answer it?

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2: ORGANIZATIONS OF PUBLIC HEALTH

2.1: Learning Outcomes

2.2: How Public Health Is Organized

2.3: U.S. Public Health Agencies

2.3.1: Centers for Disease Control and Prevention

2.3.2: The FDA and USDA

2.3.3: The Environmental Protection Agency

2.4: Quasi-Governmental Organizations

2.5: State and County Health Agencies

2.5.1: Organization within a public health department

2.6: Non-Profit Organizations

2.7: The World Health Organization

2.8: 2025 Reorganization of HHS

2.9: Challenges within the Public Health System

2.10: Example of Public Health Organizations Working Together

2.11: The Whole School, Whole Community, Whole Child Model

2.12: Core functions of state and local public health agencies and the 10 essential services

2.13: Public Health Involves Making Public Policy for the Public Good

2.14: Documentary- The Invisible Shield episode 1

2.15: Additional Resources

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2.1: Learning Outcomes

By the end of this chapter, readers (learners) will be able to

1. Explain what a governmental health organization is and give an examples at the following levels: international, national, state and local.
2. Describe the decentralized structure of public health in the United States, including some pros and cons of decentralization.
3. Explain in basic terms the role of the World Health Organization (WHO).
4. Give examples of agencies and functions within the U.S. Department of Health and Human Services (DHHS), prior to 2025 and after the 2025 reorganization.
5. Discuss criteria that should be used to evaluate the impact of a major reorganization of public health systems in 2025.
6. Discuss examples of how state and local health departments work together to tackle major health threats.
7. Describe the three core functions of public health (assessment, policy development and assurance) and give examples of each.
8. Recognize the 10 essential public health services and discuss their relationship to the three core functions.
9. Discuss the contributions of both governmental and non-governmental public health organizations to the health and well-being of the public.
10. Examine factors that influence the effectiveness of public health organizations.
11. Explain the importance of collective responsibility and public policy to public health -- and how that is sometimes in tension with other values, like individual responsibility or individual rights.
12. Discuss various viewpoints on the public health impacts of the reorganization of federal public health agencies and funding under the Trump Administration.

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2.2: How Public Health Is Organized

Public health is a part of our government at all levels in the US. In addition, large nongovernmental agencies and smaller nonprofit organizations also play a significant role in public health.

Public health in the US is a highly **decentralized system.** While federal agencies offer guidelines, research, and funding that empowers public health efforts at the states, and some key processes (like the approval of new pharmaceuticals by the FDA) are centralized within specific agencies, for the most part, public health mandates and rules are issued at the state level. Therefore, different states may have different mandates or standards, regarding public health, and they may promote quite distinct approaches to public health challenges.

There are both pros and cons to having a decentralized public health system.

- On one hand, the variety of approaches across states can lead to innovations and can respond to local needs and conditions. Where decentralized public health units (for example, state health departments in the Northeast of the US, or provincial health departments in Canada) have a long tradition of collaboration, they may be able to mount a response to a health threat more quickly than a centralized power, especially if that central government is hesitant to act for political reasons. Also, having a strong, decentralized network of local providers can provide a nimble response in a crisis, for example, quickly distributing vaccines to those who need them.
- On the other hand, a more unified response would sometimes be more effective. Decentralized units may have difficulty working together or may compete for resources (as various states competed for access to ventilators early in the covid pandemic). Their collaboration and data sharing may be purely voluntary. There can be repetition of efforts -- for example, translating health information or developing tests for a certain disease -- that would be more efficient if done in a centralized way. Where a central health agency takes an evidence-based approach to public health, uniform guidelines or programs can benefit the public more quickly.

Given the decentralized nature of public health in the US and internationally, it is helpful to understand the roles played by major public health organizations. Public health organizations are often grouped into five major buckets:

- International -- intergovernmental organizations like the World Health Organization (WHO)
- Federal -- national organizations like the Department of Health and Human Services (HHS) and the Centers for Disease Control and Prevention (CDC)
- State -- state health departments (in all 50 states plus similar organizations in US territories like Puerto Rico and Guam)
- Local (city, county, or region within a state) -- local health departments
- Nongovernmental agencies -- large quasi-governmental organizations like the Red Cross, in particular, but also small local nonprofits

At each level, a variety of **different professions** work together in public health -- epidemiologists, doctors, nurses, health educators, lab scientists, outreach workers, and more.

This page offers a general overview of key agencies at these different levels. More specific information is contained in pages below.

International

At the international level, the World Health Organization or WHO is the world's public health agency. WHO tracks health data, develops policies and programs, and assists national public health organizations in responding to epidemics and other health crises. WHO membership includes 194 nation-states plus two associated semi-states, Puerto Rico and Tokelau. The WHO (like UNICEF and UNDP) is part of the UN structure. WHO works with world governments and also builds partnership agreements to work with non-governmental organizations (NGO's).

UNICEF (focused on children), UNFPA (focused on family planning), UNDP (focused on development) and other agencies that operate under the UN or regional entities (like the Pan American Health Organization, PAHO) also do a great deal for public health.

Federal

At the national level (federal), we have the U.S. Department of Health and Human Services (HHS) as the central coordinating body for health. Most of the centers traditionally housed under HHS relate to public and community health -- for example, consider the Indian Health Service, the Substance Abuse and Mental Health Services Administration (SAMHSA), the Food & Drug Administration (FDA), the National Institute for Occupational Safety and Health (NIOSH), and the research-oriented National Institutes of Health (NIH). These big federal agencies support research and policy development, and they monitor health trends. A few also provide healthcare directly -- for example, the Indian Health Service and the Veterans Administration. Others administer the funding for healthcare, like the Centers for Medicare and Medicaid Services (CMMS) and the Health Resources & Services Administration (HRSA).

Of all of these centers, the one most directly charged with protecting the public's health has been the **Centers for Disease Control & Prevention or CDC, our nation's primary public health institution**. The CDC monitors the health of the nation (as well as international health trends) and publishes health statistics. It is a great source for general health information, as well examples of public health campaigns and priorities. They develop and disseminate model programs and policies for local health departments to adapt. The mission of the CDC is to protect the public from public health threats, promote health and to respond to any health threats that arise, from a flu epidemic to bioterrorism.

> **Mission of the CDC:**
>
> - CDC works 24/7 to protect America from health, safety and security threats, both foreign and in the U.S. Whether diseases start at home or abroad, are chronic or acute, curable or preventable, human error or deliberate attack, CDC fights disease and supports communities and citizens to do the same.
> - CDC increases the health security of our nation. As the nation's health protection agency, CDC saves lives and protects people from health threats. To accomplish our mission, CDC conducts critical science and provides health information that protects our nation against expensive and dangerous health threats, and responds when these arise.

In 2025, the federal public health and healthcare systems are currently being reorganized. As this chapter is being written (April 2025), HHS is being overhauled, and some of the leading federal agencies in public health (including the CDC, SAMHSA, NIOSH, and others) are being eliminated or fundamentally changed. See 2.2.2: 2025 Reorganization of HHS for more discussion of the vision and impacts of this reorganization.

State

At the state level, each state has at least one agency that focuses on health. In California, we have the Health and Human Services Agency taking the lead on health policy and enforcement. Within that agency, there are many departments: Department of Public Health, Department of Health Services, Department of Aging, etc. Local public health agencies often receive funding and mandates from the state Department of Public Health, while public hospitals might work more closely with the Department of Health Services or in the case of state-run hospitals, the Department of State Hospitals.

California's Department of Public Health supports local health departments by providing model programs, funding, data, research, and other services to support local health efforts.

Local

Each local area in the US also has a health department. A local area is usually defined as a city, a county, or a group of counties. The San Francisco Department of Public Health is our local agency.

Each place in the US organizes their public health departments a little differently. In some states, mental health and physical health are under the same public health department. In other states, they are separate. In some counties, the same thing - some combine mental health with physical health, and some separate it out to a different agency. Some public health departments just focus on prevention and policy, while others also run the local hospital and clinic system. There is a lot of variety, place to place.

Example:

- The San Francisco Department of Public Health is responsible for running a network of clinics, the big General Hospital, and a big public skilled-nursing facility called Laguna Honda. It also runs prevention programs (everything from encouraging exercise to reducing violence) and develops public policies and guidelines. Community Behavioral Health Services - working on mental health and substance abuse issues - is part of the San Francisco Department of Public Health. SF DPH is one big department, working on many facets of health.
- In contrast, the Alameda County Public Health Department across the Bay has a more limited mission. It does not run the clinics or the hospitals - a separate Health Services agency does that. It does not run the mental health or substance abuse services - the county Department of Mental Health does that. So the Alameda County Public Health Department focuses mainly on community education, mobilization, environmental health measures, monitoring health and other prevention efforts.

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2.3: U.S. PUBLIC HEALTH AGENCIES

In the next several pages, you will find more detailed information about key public health agencies in the US, at different levels of government as well as nongovernmental agencies.

4.2 U.S. Public Health Agencies

The U.S. Department of Health and Human Services (HHS) is a federal executive department responsible for promoting and protecting the health and well-being of all Americans. Its primary mission is to enhance the health and human services available to the U.S. population, ensure the safety of food and drugs, advance medical research, and administer various social welfare and healthcare programs. HHS plays a crucial role in shaping and implementing policies related to healthcare, public health, and human services in the United States. The president of the United States appoints secretaries to their cabinet to lead HHS and its agencies. Therefore, the leadership and focus of each of these agencies can change with each new federal administration.

Agencies that HHS oversees include these listed below. We'll go over a few of them in more detail later on in this chapter.

- The **Food and Drug Administration (FDA)**: This agency is responsible for regulating and ensuring the safety of food, drugs, medical devices, vaccines, cosmetics, supplements, and tobacco products. Prescription drugs, medical devices, and biologics (like vaccines) have to go through rigorous testing to get approval by the FDA. If people are getting sick from a particular food or infant formula, or if the food company did not correctly label the food for potential allergens, it is part of the FDA's role to investigate where the contaminated food is coming from and issue recalls. It is important to note that nutritional supplements and herbs are regulated by the FDA but not in the same way as drugs (Office of the Commissioner, 2023).

- The **Centers for Medicare and Medicaid Services (CMS)**: CMS administers the nation's major public healthcare programs: Medicare and Medicaid. Medicare is primarily for people over 65 years of age, and Medicaid is designed to provide healthcare for people in poverty and those with disabilities. Sometimes seniors who are also living in poverty are supported by both systems. The Children's Health Insurance Program (CHIP) is also a part of Medicaid - both of which are funded by both the federal government and state governments. CHIP supports healthcare for children whose parents may make too much money to qualify for Medicaid, but not enough to afford private health insurance (Centers for Medicare and Medicaid Services, n.d.). Medicare and Medicaid are the largest payers of healthcare in the US. For example, over 40% of all births are paid for by Medicaid (Valenzuela & Osterman J.K., 2023).

- The **National Institutes of Health (NIH)**: This is the primary agency for conducting and supporting medical research, including funding research into diseases, public health, and medical innovation. The sprawling NIH campus located in Bethesda, Maryland, includes a clinical research hospital and laboratories focused on specific areas of cutting edge health research - called "intramural research". But the NIH is also responsible for funding "extramural research" through grants . These grants fund research in health and science at universities, medical centers, laboratories and other institutions, both in the U.S. and abroad (NIH, 2025).

- The **Centers for Disease Control and Prevention (CDC)**: The CDC is probably the most familiar public health agency to Americans. This is because it is the primary national public health agency which focuses on disease prevention, emergency preparedness, and the tracking of public health data. The CDC is also the nation's primary epidemiological center, and conducts surveillance of current health issues affecting Americans. Headquarters of the CDC are located in Atlanta, GA.

- The **Administration for Children and Families (ACF)**: This agency administers various programs and services aimed at promoting the economic and social well-being of children, families, and communities. These programs include financial assistance like the Temporary Assistance for Needy Families (TANF), support for children with disabilities through the Head Start program, support for foster kids, or help paying for childcare or utilities (ACF, 2024).

- The **Substance Abuse and Mental Health Services Administration (SAMHSA)**: SAMHSA works to improve mental health and reduce the impact of substance abuse and addiction. This agency has 9 regional offices around the U.S., and collaborates with regional and local agencies to support initiatives tackling substance abuse, suicide prevention, and other behavioral health issues (SAMHSA, 2024).

- The **Agency for Healthcare Research and Quality (AHRQ)**: Established in the 1990s after several reports found that medical errors contributed to a large number of deaths, this agency conducts research to improve the quality, accessibility,

and affordability of healthcare services in the U.S. The agency's focus is on patient safety and preventing medical mistakes, as well as reducing healthcare costs and improving efficiency (AHRQ, 2025).

- The **Indian Health Service (IHS)**: Established in the 1950s, this agency provides healthcare services to more than 2 million American Indian and Alaska Native populations. The IHS comprises not only hospitals and clinics in rural and urban tribal areas, but also tackles the complex public health needs of tribes including water fluoridation, pandemic response, and diabetes management (Kruse et al., 2022).

HHS as it exists today was established in 1979. However, its origins can be traced back to the early 20th century when the federal government started to take an active interest in public health and welfare issues. The predecessor agencies and departments that eventually merged to form HHS include the United States Public Health Service, the Social Security Administration, and various other federal agencies responsible for health and welfare programs. Over the years, HHS has played a pivotal role in shaping healthcare policy, conducting research, and administering various programs to improve public health and human services across the United States. It has been instrumental in the implementation of significant healthcare reforms, including the Affordable Care Act (aka "Obamacare").

Update

In 2025, the second Trump administration took drastic steps to cut federally funded programs, including reducing employees by 20,000 (through firings and early retirement), closing 5/10 regional offices around the country, and collapsing several agencies into one titled the "Administration for a Health America" (AHA). This new agency will contain these former agencies: Office of the Assistant Secretary for Health (OASH), Health Resources and Services Administration (HRSA), Substance Abuse and Mental Health Services Administration (SAMHSA), Agency for Toxic Substances and Disease Registry (ATSDR), and National Institute for Occupational Safety and Health (NIOSH), with the promise of creating a more efficient use of taxpayer dollars (HHS Press Office, 2025). Some programs have been eliminated entirely or their funding moved to the new AHA agency, including those that focus on chronic disease prevention, global health, HIV prevention and research, birth defects, developmental disabilities, injury prevention, and occupational safety and health (Gold & Ingram, 2025). The NIH is slated to lose around 43% of their budget that funds cutting edge biomedical research, threatening the discovery and development of new treatments and drugs, which will eventually translate into shorter lifespans and a significant economic impact (Cutler & Glaeser, 2025). Other cuts under this administration threaten the Environmental Protection Agency which is losing both funding and staff, including the majority of their scientific staff - including biologists and toxicologists (Daly, 2025). The small Agency for Healthcare Research and Quality (AHRQ) is likely to also be eliminated (Allen, 2025). Public health experts warn that these cuts to funding will have immediate, profound, and likely deadly effects. Food safety, children's health, senior programs, emergency preparedness, drug treatment, and cutting edge research will all suffer, leading to a rise in preventable disease and death (For Our Health, 2025).

Without a good understanding of what each of these agencies do, it may be difficult to anticipate the impact that these cuts and firings will have on the future of public health in America. In the next few pages, we'll focus specifically on a few agencies and what they do to protect our population's health.

As this book is being written and compiled, major changes are underway in the federal public health infrastructure, with ripple effects on state and local health agencies, and even international health organizations. For more information on those changes, see Public Health Reorganization in 2025.

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2.3.1: Centers for Disease Control and Prevention
2.3.2: The FDA and USDA
2.3.3: The Environmental Protection Agency

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2.3.1: Centers for Disease Control and Prevention

Centers for Disease Control and Prevention

The Centers for Disease Control and Prevention (CDC) is a critical agency within the U.S. Department of Health and Human Services, dedicated to safeguarding public health and promoting the well-being of Americans. The CDC's primary responsibilities include:

- **Disease Surveillance and Control:** The CDC monitors, tracks, and investigates the spread of diseases, both infectious and non-infectious. It works to identify and control outbreaks of diseases, providing guidance and recommendations to prevent their spread. This includes timely communications about the rates of disease or health conditions to the public. For example, The Morbidity and Mortality Weekly Report (MMWR) is the “voice of the CDC”, providing public health practitioners around the country with up-to-date statistics, information, and evidence-based practical recommendations (CDCMMWR, 2025).

- **Health Promotion and Education:** The CDC conducts public health education and awareness campaigns to inform the public and healthcare professionals about health risks, preventive measures, and healthy behaviors. This includes initiatives to combat smoking, obesity, substance abuse, and other health-related issues.

  Current Example 2.3.1.1

  - The CDC has run an anti-smoking ad campaign called “Tips from Former Smokers” since 2012 which features real stories from people suffering the negative health effects of cigarette smoking. At the end of each television or streaming ad, a phone number is provided to connect people to quitting smoking resources in their own state - and a recent study suggests that calls to the quit smoking line increase when more ads are played (CDCTobaccoFree, 2025, Mann et al., 2024). Unfortunately, recent cuts to the CDC budget are threatening this program and many others (Edwards, 2025).

- **Vaccine Development and Promotion:** The CDC is involved in the development, testing, and distribution of vaccines. It plays a crucial role in promoting immunization and vaccination programs to prevent and control vaccine-preventable diseases.

  Current Example 2.3.1.2

  - The CDC hosts the Advisory Committee on Immunization Practices (ACIP); a group of virologists and immunologists who discuss and recommend evidence-based vaccine schedules that are then disseminated to physicians and other healthcare professionals. That has been the role of ACIP historically, although recently it was disbanded and new members (some of whom are public anti-vaccine activists or have conflicts of interest with anti-vaccine groups), were put in place by RFK Jr., the current HHS secretary who is also known for his anti-vaccine rhetoric (Ducharme, 2025, Schnirring & Van Beusekom, 2025). These and other recent changes to vaccine recommendations have caused several medical and public health organizations - including the American Academy of Pediatrics (AAP), the American College of Physicians (ACP) and the American Public Health Association (APHA), among others - to sue the administration (AAP, 2025).

- **Chronic Disease Prevention:** The CDC focuses on preventing and managing chronic diseases like heart disease, diabetes, and cancer by promoting healthier lifestyles and supporting research in these areas.

Current Example 2.3.1.3

- The Diabetes Prevention Program (DPP) trains and certifies lifestyle coaches and provides curriculum for local organizations to support people diagnosed with prediabetes (the precursor to Type II diabetes). Lifestyle changes like improving nutrition, increasing physical activity, and losing weight (if obesity is present), can reduce the risk of Type II diabetes by over half. The DPP also partners with Medicare to fund access to this program for seniors (CDC, 2025b).

- **Global Health:** The CDC works on a global scale to combat infectious diseases worldwide. It collaborates with international partners and organizations to strengthen public health systems and respond to global health crises.
- **Environmental Health:** The CDC assesses environmental health risks, including exposure to hazardous substances, and provides guidance to protect public health from environmental threats.
- **Emergency Preparedness and Response:** The CDC plays a crucial role in preparing for and responding to public health emergencies, including natural disasters, bioterrorism, and infectious disease outbreaks. In fact, the CDC is at the forefront of coordinating the country's national response to epidemics and pandemics: including tracking the spread of the disease, providing resources, guidance, and information to local public health agencies, developing and distributing tests and protective equipment, and supporting the development of vaccines and treatments, as well as coordinating with other countries around the globe (CDC, 2025a).

The CDC's history dates back to 1946 when it was established as the Communicable Disease Center in Atlanta, Georgia. The organization was initially focused on preventing the spread of malaria. Over the years, its mission expanded to address a wide range of communicable diseases. In 1970, it was renamed the Centers for Disease Control to reflect its broader responsibilities in health protection. In 1980, the CDC was integrated into the U.S. Public Health Service and became part of the U.S. Department of Health and Human Services. The "Prevention" was added to its name, making it the Centers for Disease Control and Prevention, to emphasize its comprehensive role in public health.

The CDC has been at the forefront of numerous public health challenges and breakthroughs, such as the successful eradication of smallpox and the control of diseases like polio and HIV/AIDS. It continues to be a vital institution in safeguarding public health, conducting research, and responding to emerging health threats, including the COVID-19 pandemic. The CDC's work has a profound impact on the health and well-being of people in the United States and around the world.

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2.3.2: The FDA and USDA

The Food and Drug Administration (FDA) and the United States Department of Agriculture (USDA) are two distinct federal agencies in the United States, each with its own set of responsibilities related to the regulation of food and drugs for public health purposes.

The FDA is a federal agency within the U.S. Department of Health and Human Services, responsible for protecting and promoting public health by regulating various products, including food, drugs, medical devices, vaccines, and other health-related items. This agency was created with the 1906 Pure Food and Drugs Act, and its role was more defined with the Federal Food, Drug, and Cosmetic Act in 1938. When it comes to the regulation of food and drugs, the FDA has the following key roles:

- Drug Regulation: The FDA evaluates and approves new drugs for safety and efficacy before they can be marketed and sold to the public. It also monitors and regulates prescription and over-the-counter medications to ensure ongoing safety.
- Food Safety: The FDA is responsible for regulating and ensuring the safety of most of the food supply in the United States, except for meat, poultry, and egg products, which are regulated by the USDA (see below). The FDA establishes and enforces standards for food labeling, inspections, and safety measures to prevent foodborne illnesses and ensure food products meet established quality and safety standards.
- Medical Devices: The FDA regulates medical devices to ensure their safety and effectiveness, from simple devices like bandages to complex ones like pacemakers. The agency classifies medical devices into different categories based on risk, and each category is subject to specific regulatory requirements.
- Vaccines and Biologics: The FDA evaluates and approves vaccines and biologic products to ensure they are safe and effective for use in preventing and treating diseases.
- Cosmetics and Dietary Supplements: The FDA regulates cosmetics and dietary supplements, ensuring that they are safe for consumer use and that product labels provide accurate information to consumers. Supplements don't have to go through the same rigorous testing for safety and efficacy that drugs do. Although manufacturers can state evidence-based claims about physiological function, for example: "calcium builds strong bones." But most nutritional supplements also have the caveat on their label that the supplement is not intended to “diagnose, treat, cure or prevent any disease”. The FDA can take action against any company that sells misbranded or adulterated products (Center for Food Safety & Nutrition, n.d.).

The USDA is a federal agency responsible for overseeing various aspects of American agriculture, including the production and safety of meat, poultry, and egg products. In the context of food and drug regulation, the USDA primarily focuses on the following areas:

- Meat and Poultry Inspection: The USDA's Food Safety and Inspection Service (FSIS) is responsible for inspecting and regulating meat, poultry, and egg products. FSIS ensures that these products are safe for consumption and that processing plants meet established safety standards.
- Food Labeling: The USDA sets labeling standards for meat, poultry, and egg products, ensuring that product labels provide accurate information to consumers.

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2.3.3: The Environmental Protection Agency

The U.S. Environmental Protection Agency (EPA) plays a significant role in public health by addressing environmental issues and hazards that can impact the well-being of the American population. The EPA's responsibilities related to public health include:

- Regulating Air Quality: The EPA sets and enforces national air quality standards to reduce the levels of harmful pollutants, such as particulate matter, ground-level ozone, sulfur dioxide, and nitrogen oxides. By reducing air pollution, the EPA helps lower the risk of respiratory and cardiovascular diseases, asthma, and other health problems associated with poor air quality.
- Safe Drinking Water: The EPA establishes and enforces regulations for the safety of drinking water supplies in the United States. This includes setting standards for contaminants in drinking water and ensuring that public water systems comply with these standards, thereby reducing the risk of waterborne diseases and exposure to harmful chemicals.
- Toxic Substances Control: The EPA regulates and assesses the risks of toxic substances and hazardous chemicals in the environment. This includes evaluating the potential health risks associated with exposure to these substances and taking measures to reduce or mitigate these risks.
- Waste Management and Cleanup: The EPA oversees the management and cleanup of hazardous waste sites and chemical spills to protect public health from exposure to toxic materials. This work helps prevent contamination of soil, water, and air in affected areas.
- Lead Poisoning Prevention: The EPA is involved in lead poisoning prevention efforts, such as enforcing regulations related to lead-based paint in homes and public facilities. Reducing lead exposure is vital for preventing developmental and health problems, particularly in children.
- Environmental Justice: The EPA addresses environmental disparities and injustices by ensuring that all communities, regardless of their socioeconomic status or demographic makeup, have equal protection from environmental hazards. This promotes public health equity.
- Research and Data Collection: The EPA conducts research and collects data to better understand the health impacts of environmental factors. This research informs policy decisions and public health recommendations.
- Emergency Response: The EPA plays a role in responding to environmental emergencies, such as chemical spills, natural disasters, and acts of terrorism, to minimize public health risks associated with these incidents.
- Public Education and Outreach: The EPA conducts public education and outreach efforts to raise awareness of environmental health issues, inform the public about risks, and provide guidance on ways to reduce exposure to environmental hazards.

By addressing these and other environmental concerns, the EPA contributes to protecting public health, reducing the incidence of environmentally related diseases, and improving overall well-being. Its work is critical for safeguarding the health and safety of the American population and ensuring that people have access to clean air, safe drinking water, and a healthy environment.

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2.4: Quasi-Governmental Organizations

In addition to government agencies like the Centers for Disease Control and Prevention (CDC) and the National Institutes of Health (NIH), there are several quasi-governmental organizations involved in public health in the United States. Quasi-governmental organizations have some government ties but may also operate independently or have public and private sector partnerships. Some prominent quasi-governmental organizations in the field of public health in the U.S. include:

- **The American Red Cross:** While officially a nonprofit organization, the American Red Cross often collaborates closely with the federal government, particularly during disasters and public health emergencies. It provides disaster relief, blood donation services, and health and safety training.
- **The National Academy of Medicine (NAM):** Part of the National Academies of Sciences, Engineering, and Medicine (NASEM), NAM provides expert advice and recommendations on various health and medical issues. Its work informs health policy and public health efforts in the U.S.
- **The National Quality Forum (NQF)**: NQF is a non-profit organization that focuses on healthcare quality and measurement. It works with public and private stakeholders to develop and endorse national standards for healthcare quality.
- **The Joint Commission:** The Joint Commission is a non-profit organization that accredits and certifies healthcare organizations and programs in the United States. It sets and enforces standards for healthcare quality and patient safety.
- **The National Patient Safety Foundation (NPSF):** NPSF, now part of the Institute for Healthcare Improvement (IHI), focuses on improving patient safety and reducing medical errors through education, research, and advocacy.
- **The National Association of County and City Health Officials (NACCHO):** NACCHO is an organization that represents local health departments across the United States. It works to advance public health at the community level, addressing local public health needs and priorities.
- **The American Public Health Association (APHA):** The APHA is a non-profit organization established in 1872, that serves as a voice for public health professionals and advocates for public health policies and practices. It also publishes public health textbooks and important public health research in the *American Journal of Public Health (AJPH),* as well as a podcast with guest public health practitioners and researchers.

These quasi-governmental organizations play important roles in advancing public health in the United States by conducting research, setting standards, providing healthcare services, and promoting public health initiatives. While they may operate independently, their work often aligns with the goals of government agencies and helps shape public health policies and practices.

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2.5: STATE AND COUNTY HEALTH AGENCIES

State and local health agencies play essential roles in protecting and promoting public health within their respective jurisdictions. These agencies are responsible for a wide range of public health activities and services to ensure the health and well-being of the communities they serve. Here are some of the key functions and responsibilities of state health agencies:

- Disease Surveillance and Control: State health agencies monitor the prevalence of diseases, conduct investigations, and implement control measures to prevent the spread of infectious diseases within the state.
- Health Regulations: They develop and enforce health regulations and guidelines related to areas such as food safety, environmental health, and healthcare facilities to protect public health.
- Immunization Programs: State health agencies administer immunization programs, ensuring that residents have access to vaccines to prevent vaccine-preventable diseases.
- Health Data Collection and Analysis: They collect, analyze, and report health data to inform public health policies, track health trends, and respond to emerging health issues.
- Emergency Preparedness and Response: State agencies coordinate and plan responses to public health emergencies, such as natural disasters, disease outbreaks, and bioterrorism threats.
- Health Education and Promotion: They engage in public health education and awareness campaigns to promote healthy behaviors and prevent chronic diseases.
- Maternal and Child Health Services: State agencies provide services and programs to support the health and well-being of mothers and children, including prenatal care and child health programs.
- Regulatory Oversight: They regulate healthcare facilities, healthcare providers, and health insurance to ensure quality and safety standards are met.

Local Health Departments are typically responsible for:

- Primary Care and Clinical Services: Local health departments offer primary care services, immunizations, family planning, and other clinical services to the local community.
- Community Health Assessment and Planning: They assess the health needs of the local community and develop health improvement plans in collaboration with community stakeholders.
- Health Inspections: Local health departments conduct inspections of restaurants, food establishments, swimming pools, and other public facilities to ensure compliance with health and safety regulations.
- WIC and Nutrition Programs: Many local health departments administer the Women, Infants, and Children (WIC) program, which provides nutrition support to low-income pregnant women and young children.
- Emergency Preparedness and Response: They play a critical role in local emergency preparedness, working with state and federal agencies to respond to public health emergencies.
- Health Promotion and Education: Local health departments engage in health promotion activities, including smoking cessation programs, substance abuse prevention, and injury prevention initiatives.
- Disease Investigation and Reporting: They investigate and report cases of notifiable diseases, collaborate with healthcare providers, and implement control measures as needed.
- Environmental Health Services: Local health departments address environmental health concerns such as water quality, air quality, and sanitation to protect public health.

State and local health agencies work in tandem to deliver essential public health services to the community. They collaborate with federal agencies, healthcare providers, non-profit organizations, and community partners to address a wide range of public health challenges and promote the overall health and well-being of their populations.

2.5.1: Organization within a public health department

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2.5.1: Organization within a public health department

Here are some of the common sections you would find in a local or state public health department:

- Infectious Diseases
- Chronic diseases
- Tobacco Control
- Maternal and Child Health
- Environmental Health
- Epidemiology
- Health Education
- Nutrition
- Public Health Nursing
- Health Communications
- Health Equity

Public health departments can be involved in many different aspects of a community's life. Some of their functions are popular with residents - for example, SF Sunday Streets with healthy food, activities, health information, and live music. A lot of people participate! Other times the enforcement efforts of public health departments might seem intrusive. For example, in the city where I live, Richmond, it is not legal to smoke inside or near an apartment or condo, to protect the rights of the nonsmokers to breath clean air. Some people like this law, and some people hate it!

As noted above, many important public health organizations are non-governmental organizations -- independent nonprofits or professional associations. Really big ones may operate in many states or nations (like the Red Cross or the American Lung Association), while others work in specific communities or regions (like the San Francisco AIDS Foundation). **Universities** and other research centers also play an important role in public health.

Questions for Reflection:

- How is public health organized where you live?
- Do you work for the public health department, or do you know anyone who does?
- Do you feel that the public health services are sufficient in your community?
- Do you think people trust the public health department? If so, why? If not, why not?
- How do (or how might) governmental and nongovernmental public health organizations work together?

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2.6: Non-Profit Organizations

There are several major non-profit and philanthropic public health organizations in the United States that play vital roles in addressing various public health issues and advancing healthcare and well-being. Here are some of the notable organizations:

- **Bill & Melinda Gates Foundation:** This is one of the world's largest philanthropic organizations, focusing on global health, poverty alleviation, and education. The foundation has made substantial investments in areas such as infectious disease control, vaccine development, and healthcare delivery improvement.
- **Robert Wood Johnson Foundation (RWJF):** RWJF is dedicated to improving health and healthcare in the United States. It supports research, policy initiatives, and community-based programs aimed at reducing health disparities, promoting health equity, and addressing social determinants of health.
- **The Pew Charitable Trusts:** Pew's health and healthcare program focuses on improving the quality and cost-effectiveness of healthcare in the U.S. It conducts research, advocates for evidence-based policies, and supports initiatives to advance public health and healthcare delivery.
- **KFF:** Originally KFF was part of the Kaiser Family Foundation as it was founded in 1948 by Henry J. Kaiser, but now has no connections to Kaiser Permanente. KFF is a non-profit journalism and research organization that publishes information and analyses on a wide range of healthcare and health policy topics (KFF, 2023).
- **The California Endowment:** This philanthropic organization works to improve the health of underserved communities in California. It supports initiatives to promote health equity, access to care, and overall well-being.
- **The MacArthur Foundation:** The MacArthur Foundation supports a variety of initiatives, including those related to juvenile justice reform, mental health, and criminal justice reform, that have public health implications.
- **The Clinton Foundation:** The Clinton Foundation addresses global health challenges and domestic public health issues through initiatives like the Clinton Health Access Initiative. It focuses on improving access to healthcare and treatment for various diseases.
- **The W.K. Kellogg Foundation:** While primarily focused on children's well-being and development, this foundation's initiatives often have a public health component. They invest in programs to address health disparities and promote healthy lifestyles.
- **The Duke Endowment:** This organization supports healthcare and public health initiatives in the southeastern United States. It funds efforts to improve healthcare delivery, reduce health disparities, and enhance overall well-being.

These non-profit and philanthropic organizations contribute to public health in various ways, including funding research, supporting policy advocacy, conducting public health campaigns, and implementing programs that address pressing health issues. Their work complements the efforts of government agencies, academic institutions, and healthcare providers in improving the health and well-being of individuals and communities.

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2.7: The World Health Organization

The World Health Organization (WHO) is a specialized agency of the United Nations responsible for international public health. It was established on April 7, 1948, with its headquarters in Geneva, Switzerland. The creation of the WHO followed the devastation of World War II and aimed to prevent future global health crises. The WHO's Constitution came into force on April 7, 1948, making it the directing and coordinating authority for international health within the UN system.

The World Health Organization serves as the global authority on public health, overseeing and coordinating international efforts to improve health and well-being worldwide. Its functions and responsibilities include:

- **Health Policy and Guidance:** The WHO provides leadership on international health matters, sets global health standards and guidelines, and promotes evidence-based policies to improve public health.
- **Disease Surveillance and Response:** The WHO monitors and responds to disease outbreaks and health emergencies, providing guidance and support to affected countries.
- **Health Systems Strengthening:** The organization assists countries in building and strengthening their healthcare systems, ensuring access to quality healthcare services.
- **Research and Innovation:** The WHO supports and conducts research in various health areas and facilitates the development of new treatments, vaccines, and interventions.
- **Health Promotion and Education:** It promotes health education, campaigns, and awareness to address health risks and improve health behaviors.
- **Emergency Response:** The WHO plays a key role in responding to global health emergencies, such as pandemics, natural disasters, and humanitarian crises.
- **Health Equity and Social Determinants:** The organization works to reduce health inequalities and addresses the social determinants of health, such as poverty, education, and access to clean water and sanitation.

The World Health Organization has achieved numerous significant accomplishments throughout its history:

- **Smallpox Eradication:** In 1980, the WHO declared the successful eradication of smallpox, one of the deadliest diseases in human history, through a global vaccination campaign.
- **Poliomyelitis Eradication:** The WHO has played a leading role in the Global Polio Eradication Initiative, which has made substantial progress toward the eradication of polio worldwide.
- **Global Health Regulations:** The organization has developed and implemented international health regulations to prevent and control the spread of diseases and health emergencies.
- **HIV/AIDS and TB Control:** The WHO has contributed significantly to global efforts to control the spread of HIV/AIDS and tuberculosis through research, prevention, and treatment programs.
- **Vaccine Development:** The WHO has been instrumental in the development and distribution of vaccines, including those for measles, rubella, and other preventable diseases.
- **Tobacco Control:** The WHO Framework Convention on Tobacco Control is a landmark international treaty aimed at reducing tobacco consumption and its health impact.
- **Pandemic Response:** The WHO has played a central role in responding to global pandemics, such as the H1N1 influenza pandemic in 2009 and the COVID-19 pandemic in 2019.

The World Health Organization's work has had a profound impact on global public health, contributing to the prevention of diseases, the promotion of health equity, and the improvement of healthcare systems worldwide. It continues to address evolving health challenges and support countries in achieving better health outcomes for their populations.

Update

Upon assuming office in January of 2025, President Trump signed an executive order to remove the United States from the WHO, citing the large financial contributions that the U.S. makes to the WHO and alleged mishandling of the Covid-19 pandemic response (The White House, 2025). Leaving the WHO is not immediate, as withdrawal requires a 1-year notice. However, public health professionals warn that the potential impacts of this action not only affect the WHO's health and humanitarian efforts around the globe, but also the capacity of the U.S. to respond to future global health threats (Public Health On Call, 2025).

In 2025, President Trump withdrew the United States from the World Health Organization. The functions of the WHO continue to be the same, although, without the scientific participation or funding from the United States, the WHO's reach may be reduced.

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2.8: 2025 Reorganization of HHS

The reorganization of the Department of Health and Human Services (HHS) is underway as this book is being written.

Among the changes being implemented:

- Staffing of HHS being reduced from 82,000 to 62,000
- 28 Divisions reduced to 15, with some functions being eliminated and others combined
- Regional offices reduced from 10 to 5
- Creation of a new division called Make America Healthy Again, or AHA, for projects selected directly by Secretary Robert F. Kennedy Jr.
- New focus on "ending America's epidemic of chronic illness by focusing on safe, wholesome food, clean water, and the elimination of environmental toxins" (HHS press release, April 3, 2025).

It is too soon to assess the full impact of this reorganization. Even on the HHS website, as of writing this page, the Organizational Chart remains as it was in 2024, suggesting that some of the proposed changes may not yet be finalized. Several lawsuits underway question the executive branch (Presidential) power to eliminate or reorganize institutions that were established by Congress, the legislative branch -- although a decision from the Supreme Court in July 2025 allowed the Trump Administration to go ahead with layoffs and program eliminations. At this moment, it seems likely that HHS will be fundamentally reconfigured, its mission changed or realigned, and its personnel and funding drastically reduced.

How might we assess the impact of such changes? Let's consider some **criteria** by which that impact might be evaluated:

- There are the criteria put forth by Secretary of HHS Robert F. Kennedy, Jr. himself:
  - Greater transparency in government agencies and improved public trust
  - Improved health and wellbeing of the population, achieved at reduced cost to the taxpayer, especially regarding chronic disease and exposure to environmental toxins
- We could also assess the changes in light of the mission of the organizations that are being changed, for example, the mission of the CDC:
  - Preparedness to respond to health threats of all types
  - Impacts on health security
  - Ability to conduct health research
  - Ability to inform the public
- Other criteria might be related to data collection and data quality. Questions to inform those criteria might include:
  - With substantial cutbacks in the public health infrastructure, what types of data continue to be collected and what types are discontinued?
  - How is the integrity of the data maintained or improved?
  - How easily are data accessed by researchers and clinicians?
  - What types of research are continued or discontinued?
- Health outcomes are where the rubber hits the road -- how do these changes affect morbidity and mortality?
  - Life expectancy overall and for sub-populations
  - Rates of disease, overall and for sub-populations
  - Access to healthcare for screening and treatment
  - Quality of life as measured by DALYs or another indicator

The articles and websites below provide public health perspectives on these changes. The majority of them are highly critical of these changes -- as the majority of mainstream public health organizations and scholars see the 2025 reorganization of HHS as a deep blow to the public's health.

In an April 2 letter from the Advisory Committee to the Director of the CDC (authorized by Congress) to the HHS Secretary and the Acting CDC Director, many different programs that have been affected by the layoffs and funding cuts were highlighted: HIV prevention, occupational health and safety, investigation of cancer clusters, asthma, violence prevention, tobacco use, lead poisoning, global health threats, and more. **"In aggregate, the breadth of these reductions is staggering and compromise many of our Nation's best efforts to attack the leading causes of preventable death and illness affecting families and communities across our country"** (Rubin, 2025, pp. 1760-1761).

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2.9: Challenges within the Public Health System

There are many different challenges facing the public health system now. On this page, we examine just a few.

Rapid reorganization

As discussed below, in 2025 a major reorganization of public health organizational structures in the federal Dept. of Health and Human Services (HHS) as well as changes to funding for public health (with major and sometimes haphazard cuts to budgets) have resulted in considerable uncertainty. While these changes are taking place at the federal level, they impact the work of state and local health departments, as well. Changes in regulations, in funding streams, in program focus, and in data collection will have long-term effects on the public health system at all levels.

> ***Optional***: Want to hear an analysis of the impact of the first 100 days of the Trump Administration on public health? This podcast from KFF Health News offers an informed take: 100 Days of Health Policy Upheaval

Challenges of decentralization

On the previous page we discussed some of the challenges and advantages of a decentralized public health system.

This has been an issue even when public health is responding well to a crisis -- it often isn't perfect. Here is something I wrote about the CDC as the acute phase of the covid pandemic was wrapping up:

Two things about the US public health system's response to covid are true at the same time:

1. Public health agencies made heroic efforts to slow the spread of disease, attend to populations in need, promote prevention, support the development and deployment of vaccines, and make sense of a fast-moving and unprecedented crisis, despite coming under serious attack from movements opposed to public health measures (attacks that have included death threats and violence toward some public health workers).
2. Public health agencies have been poorly coordinated in their response, have issued confusing and sometimes contradictory messages to the public about how to stay safe, and were very slow to turn information into action, in several key moments.

Underfunding

When a major public health crisis emerges -- such as the covid pandemic that began near the end of 2019, or anthrax attacks that followed the attacks of September 11, 2001 -- Congress has typically increased funding to public health. It takes a great deal of resources to respond to a broad threat to health. However, between crises, the funding often shrinks back to minimal levels. On a per capita basis, public health agencies receive less funding now than they did 20 years ago. As we saw in Chapter 1, public health's successes are often out of the public's eye -- bad events that got prevented and never happened. The Trust for America's Health issued a 2024 report showing that core public health functions were significantly underfunded, even as the population grows and the threats to health multiply. This shortage of funding has only been magnified by the significant 2025 cuts to public health infrastructure, cuts of over one-third of all funding to the Department of Health and Human Services, including cuts of over 20,000 workers. While there is no doubt that any large agency could be made more efficient and effective with some well-planned reorganization, the rapid and severe cuts implemented in 2025 are likely to make the agencies less efficient and effective, not more so.

Trust and communication

Public health agencies have too often communicated with the public in a way that doesn't connect. Instead of providing clear guidance, we offer too much context. Or we err in the other direction, coming across as mandating actions without providing clear reasons for those actions. Sometimes we offer nuanced explanations with too much jargon, leaving everyone confused.

The breakdown of communications from public health entities to the public has contributed to a breakdown in trust among a significant portion of the American public.

Without public trust, public health cannot do its job successfully. It doesn't help that misinformation and even disinformation has been generated to fill the gap, as more and more people turn to nontraditional sources for their health information. And in recent months, vaccine skeptics and others have taken major roles in the very public health agencies that, traditionally, have provided science-based answers. It is unclear what this will mean for science-based decision-making in the future.

Science is always evolving

The evolving nature of science means that public health agencies are sometimes forced to act on incomplete knowledge. Research takes time. New results or new information takes time to be thoroughly checked out before it is considered proven. The gap between what we know and what we need to know is even greater during a public health emergency. Many people were frustrated with changing advice during the covid pandemic, for example. Masks needed or not? How much distance is needed for social distancing? What about washing off our groceries? If you lived through the early years of covid, you know that it was often confusing!

But simply because the science was changing doesn't mean that the public health advice was based on nothing. It was based on the evolving science that helped us to understand a brand-new virus. For example, it was pretty quickly shown in the lab that the virus could linger on surfaces for some time, and that's why we were washing off our groceries and worrying about touching banisters. But it took a little longer to show that, while this was a theoretical risk, in practice, that was NOT how people were catching covid. The covid virus was being transmitted through the droplets (emitted when we talk, sing, or cough) and by aerosols that linger in the air longer. Understanding droplet transmission led to social distancing recommendations, and understanding aerosol transmission highlighted the need for good ventilation. Public health had to respond before all the research was done, leading sometimes to mistakes yet still, overall, to a huge impact on people's health. Social distancing and other public health measures are credited with saving upwards of 860,000 lives in the US in the first six months of the covid pandemic, alone (Yakusheva, et al., 2022).

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2.10: Example of Public Health Organizations Working Together

The **Whole School, Whole Community, Whole Child (WSCC) Model** is a great example of public health organizations at different levels, both public and private, working together to improve community health. Federal, state and local health departments partner with federal, state and local education agencies and school districts (all public entities), plus nonprofit (private) community organizations and community health agencies. By coordinating and aligning their efforts, they have a greater impact on the health of children and their families.

It's also a good example of the Ecological Model in action. To quote the textbook, which is quoting the CDC-ASCD partnership, "The focus of the WSCC model is an ecological approach that is directed at the whole school, with the school in turn drawing its resources and influences from the whole community and serving to address the needs of the whole child."

You can see how the people who planned this intervention thought about all levels of the Ecological Model.

- **At the individual level is the child** -- this intervention aims to support healthy behaviors in the child and to reduce risk factors that the child may have based on their age, personality, behaviors or "gestational endowment" (the body and genes they were born with). It also aims to empower students as active participants in their learning and health.
- **At the relationship level is the family** -- this intervention seeks to involve the family in improving the child's health and health behaviors. Peers and friends are also at the relationship level -- this intervention aims to change the social norms at the school (community level) and this will affect how friends and peers interact. Changing the relationships among teachers, families and students is an action that bridges the relationship and community levels.
- **This intervention is mostly focused on changes at the community level:** changes in school policies, in the classroom, in the lunch room, etc. It also promotes linkages with community organizations and services. It takes into account the social and emotional climate, the physical environment, community involvement and family engagement. It could also include addressing ***implicit bias*** or discriminatory policies or behaviors on the part of school personnel.
- **At the societal level,** the CDC as a federal agency provides training and funding to help schools and communities implement this vision.

The WSCC Model developed this image to summarize what they do:



The following page offers a little more detail about this program and its activities.

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2.11: The Whole School, Whole Community, Whole Child Model

Public schools have the perfect opportunity to improve the health of the communities they serve. They can become a hub for engagement with families, employees, and other community members. Many of the lifestyle behaviors that adults engage in are habits and norms formed during childhood. So schools may be an optimal setting to reinforce health behaviors such as personal hygiene (for example brushing teeth and handwashing), physical activity, healthy nutrition, and interpersonal skills (such as conflict resolution). Nearly all of the social determinants of health are interconnected with public schools and their programs:

- educational access and quality (including comprehensive health and physical education),
- healthcare access and quality (e.g. school based health centers, school nurses, health insurance for employees, and employee wellness programs),
- neighborhood and built environment (by providing safe physical environments for learning, as well as becoming a community center for other community activities),
- social and community context (with family and community engagement, schools can improve social cohesion and civic participation),
- economic stability (by assisting families in need with school meal programs, and improving future economic stability via student academic success).

Given the far-reaching influence of public education on the social determinants of health, it may seem obvious that public schools are an important setting for public health efforts. However, in order for health promotion in public schools to be truly effective, it needs to be holistic, including policies, procedures, and people from all aspects of the school community. The Whole School, Whole Community, Whole Child (WSCC) school health promotion model provides a comprehensive framework to implement holistic public health interventions at the local level. See Figure 9.1 below for a diagram of this model.



Figure 2.11.1: Whole School, Whole Community, Whole Child model: A collaborative approach to learning and health. Centers for Disease Control and Prevention. (Retrieved from: https://www.cdc.gov/healthyschools/wscc/index.htm)

The WSCC model places the child at the center of the framework, as the children served are the focus of public school education. In the first circle, the model prioritizes a learning environment where students are safe, engaged, supported, challenged and healthy. In order to support both the learning process and overall health of the child, it is recognized that policy, process, and practice will need to be coordinated around these goals. To that end, the WSCC model includes 10 components, surrounded in the outer circle by the community itself. These components are:

1. Physical education and physical activity.
2. Nutrition environment and services.

3. Health education.
4. Social and emotional climate.
5. Physical environment.
6. Health services.
7. Counseling, psychological and social services.
8. Employee wellness.
9. Community involvement.
10. Family engagement.

The WSCC model "recognizes that schools and communities have a shared responsibility for the health and education of children and youth", and that "The relationship between the school and the community affects the entire community, not just the students attending the school", (Lewallen et al., 2015). The families of children attending the school, the employees who work at the school, and the community members who engage with the school all contribute to and benefit from healthy schools.

The WSCC model is not an intervention itself, but rather the framework that can be used by schools and communities to implement changes at their schools which address the needs of their students, families, employees, and communities. Meeting such broad goals requires the support of school administration at minimum, typically along with a well-organized school health advisory council, and perhaps even a school health coordinator (or a current employee with the appropriate training and educational background who can take on that role). The buy-in of the school administration, staff, and parent groups is ultimately necessary to create meaningful school health policies and implement health-related programming and messaging (Seabert et al., 2021). Below we will examine each of these 10 components in greater detail.

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- 9.7: The Whole School, Whole Community, Whole Child Model by Erin Calderone is licensed CC BY 4.0.

2.12: Core functions of state and local public health agencies and the 10 essential services

Here are a few things you already know about public health: Public health is all about prevention. Public health focuses on populations. Public health cares about social justice.

But *how exactly* does public health do that?

Public health institutions, in particular local or state health departments, are charged with fulfilling three corefunctions of public health.These three functions are:

- Assessment
- Policy Development
- Assurance



To carry out those 3 core functions, public health agencies provide 10 essential services, as a minimum.

Let's look at how they are related. The diagram above -- from the CDC -- summarizes the information well.

Assessment

Assessment means "we have to figure out what's going on, before we begin to do something about it."

Assessment includes actions like

- Monitor health through regular reporting of the community's health status - number of deaths, number of births, number of flu cases, etc.
- Diagnose and investigate to understand the causes of a new outbreak of disease, or the risk factors associated with bad health.

Policy Development

Policy Development means figuring out what we can do about the problem, and then doing it.

Policy development includes actions like

- Inform, educate and empower clients and community residents so they can do something about their own health and their families' health.
- Mobilize community partnerships to change the *conditions* of health in the neighborhood or city or county. A Re-Entry Council might be one example of a community partnership, working to change health conditions.
- Develop policies to make lasting changes in our health - for example, expanding WIC, allowing access to food stamps for the formerly incarcerated, or reforming healthcare ("Obamacare").

Assurance

Assurance means making sure the job gets done and gets done right.

Assurance includes actions like

- Enforce the laws that protect our health - which can include things like inspecting restaurants for cleanliness, or making sure that the drinking water supply is kept clean.
- Link to and provide care to those who need it, by coordinating our services in the public health sector (say, between hospitals and clinics) and with other institutions.
- Assure a competent workforce by providing training and education for people who work in public health.
- Evaluate programs and policies, and use that evidence to improve them.

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2.13: Public Health Involves Making Public Policy for the Public Good

When we think and talk about improving health these days, it often comes down to discussions of our **personal behaviors.** Are you eating a vegan diet? A "Paleo" diet? Do you make it to the gym regularly? How many servings of alcohol do to you consume in a week (if any)? Do you smoke tobacco (or anything else)?

These are important health questions! And certainly, there is a large amount of public health efforts that go into influencing individual behaviors. You have probably seen ads like the ones below (optional viewing):

As much as public health might spend on advertising campaigns like "5 a day" (eat 5+ vegetables or fruits a day) or the old "kick the habit" (quit tobacco) campaigns, the industries that sell junk food, tobacco, alcohol, and so on are always going to spend more on their marketing campaigns. It is very hard to change human behavior! Just having health knowledge (as important as that is) is seldom enough to make a large-scale change in health behaviors across a population.

And in public health, we focus on populations.

So how do we best improve the health of populations?

If we can change something in the environment that reduces the risk for lots of people (like, put speed bumps on that road where people drive too fast) **or create a policy that removes a danger** (like, laws that reduce asbestos use) **or makes the healthier choice the easier choice** (like, rules that require schools to offer water instead of juice or soda), **then we are likely to affect a lot more people's health.**

Public Health is a Public Good

A "public good" is something that is created by our collective or governmental efforts, rather than through a private business, that benefits everyone, and that is (at least theoretically) available to everyone in a non-competitive way. For example, if you are healthy, it doesn't mean there is less health available for me -- I can be healthy too. And what makes us healthy includes things that it would be very hard or impossible to obtain individually -- like, functioning sewer systems and clean water and clean air. So it is clearly a public responsibility to work for the public good, including public health. In the United States, there is a strong ethic or belief in neighborliness, in stepping up to a challenge together, in patriotism, and in **a sense of collective or mutual responsibility**. Public health is closely connected to these values.

Sometimes this clashes with another strong ethic or belief in the United States, that of **individualism and individual choice.** When a law goes into effect that shapes a health behavior -- for example, the "click it or ticket" seat belt law -- there will be people who resist it, saying, "It's my own darn business if I choose to wear a seatbelt or not!" Sure, that's true. But if a person is badly injured because of not wearing a seat belt, the cost of their hospitalization will be partly paid by all of us -- either through public insurance programs like Medicare or Medicaid, or through rising premiums on private health insurance. The doctors attending that person aren't available to attend other patients. Indirectly, there are costs to the larger society. This is part of why public health workers often support laws that may place the public good ahead of individual choices.

The process of making public policy involves balancing these competing ideas and values. Often there are tensions, and we don't always see different prevention strategies the same way (even within public health circles).

Can you think of any examples of seeking a balance between the right to individual choice versus the desire to create a safer or healthier community for all?

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2.14: Documentary- The Invisible Shield episode 1

A recent documentary series (4 episodes), *The Invisible Shield*, examines the role and functioning of public health in detail, in the context of the covid pandemic and some of the backlash to public health measures. This first episode highlights key responsibilities of public health agencies at the local level, as well as actions of the CDC and of research institutions, during a pandemic. I think it will help you to understand assessment, policy development, and assurance better -- and more importantly, give a vivid picture of how public health agencies work for the public.

As you watch the episode below (streaming free from PBS, the Public Broadcasting Service), please consider the following questions:

1. How does the information in this episode affirm or contradict the information in the first two chapters of this book?
2. Why is public health infrastructure described as an "invisible shield"?
3. What were some of the challenges that public health organizations experienced with assessment (detecting, measuring, and understanding a threat to health) -- either in the covid epidemic or another example?
4. What examples did you see of public health organizations influencing policies to inform, mobilize, or protect communities during a disease outbreak?
5. How did public health organizations adjust or change their approach to disease over time?
6. What role does public trust play in effective public health measures?
7. How are some of the themes in this documentary showing up in public policy about health today?

Interactive Content

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this Interactive Content online

At least one additional episode from this series is incorporated into a later chapter of this book. The entire series is available and free to the public at https://www.pbs.org/show/the-invisible-shield/.

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2.15: Additional Resources

Here are additional (optional) resources if you want to learn more about this subject:

Ten Essential Public Health Services (CDC)

The Impact of Chronic Underfunding of America's Public Health System (Trust for America's Health, 2024)

CDC in Crisis: Who are the top officials fired or being forced out? (Guardian newspaper, 2025)

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3: SOCIAL DETERMINANTS OF HEALTH

Author's note: This chapter is a work-in-progress and has not yet been fully revised or updated, as of 2025. Also, part of the chapter refers to a video that is not OER -- the *Unnatural Causes* series -- that offers some clips for free, but the full videos are only available through libraries that have a license (try Kanopy at your local college or public library) or for a fee on Vimeo. Towards the end of the Chapter, there is a section borrowed from an Open Stax textbook, explaining more about several *specific* social determinants, such as housing, employment, etc.

3.1: Learning Outcomes

3.2: What are "social determinants of health?"

3.3: Healthy People 2030 and the Social Determinants of Health

3.4: Ecological Model and the Social Determinants

3.5: UNNATURAL CAUSES- In Sickness and In Wealth

3.6: Social determinants have a major impact on health.

3.7: Embodiment

3.8: Inequality Itself Correlates to Worse Health

3.9: Inequality in the United States

3.10: Making Change

3.11: Actions that work toward equality and health

3.12: Making Changes to the Social Determinants Benefits Health

3.13: Change Can Happen

3.14: Supplemental Reading on Social Determinants Affecting Health Outcomes

3.14.1: Introduction

3.14.2: Economic Stability

3.14.3: Neighborhood and Built Environment

3.14.4: Educational Environment, Access, and Quality

3.14.5: Social and Community Context

3.14.6: The Cumulative Effect of Inequalities on Health

3.14.7: Chapter Summary

3.14.8: Key Terms

3.14.9: Review Questions

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3.1: Learning Outcomes

In this Chapter, we grapple with the big questions of **what makes one group of people healthier than others**. The chapter focuses on the **Social Determinants of Health**, a core dimension of public health today. A focus on health equity and social determinants is seen in the Healthy People 2030 goals for our nation, and it is a subject that we will come back to many times during the semester.

By the end of this Chapter, students will be able to:

1. Define and give examples of social determinants of health.
2. Discuss and give examples of health inequities (also called health disparities or health inequalities) that result from social inequities.
3. Describe the evidence that supports the assertion that social determinants are better predictors of health outcomes than any other determinant (such as genetics or health behavior).
4. Define the term "embodiment."
5. Explain in basic terms three of the mechanisms through which researchers believe that social determinants are "embodied" or biologically affect health.
6. Explain the distinction between ways that social determinants affect health behaviors and ways that social determinants affect health through other pathways that don't involve behaviors.
7. Discuss the evidence that inequality itself is correlated to worse health.
8. Discuss at least one community effort to address the social determinants of health.
9. Describe at least one public policy that has had the effect of decreasing health inequities, by changing a social determinant (like access to education or access to healthcare).
10. Explain the influence of neighborhood or county, as well as nation or state, on one's health, as shown in data.
11. Tell the story of at least one concrete example of how social determinants can be or have been altered in ways that improve health outcomes.

PLEASE NOTE: As part of the chapter refers to the Unnatural Causes video (available to stream in Canvas through the CCSF Library*), this Chapter was originally divided into two parts. While those two parts have been combined, please forgive any remaining mentions of a "part 1" or "part 2" of this chapter (which may be referred to as a Lesson).

* if you are not a student at City College of San Francisco, you can view free clips of Unnatural Causes, view the episode for a fee on Vimeo, or contact your library for access to the Unnatural Causes video series.

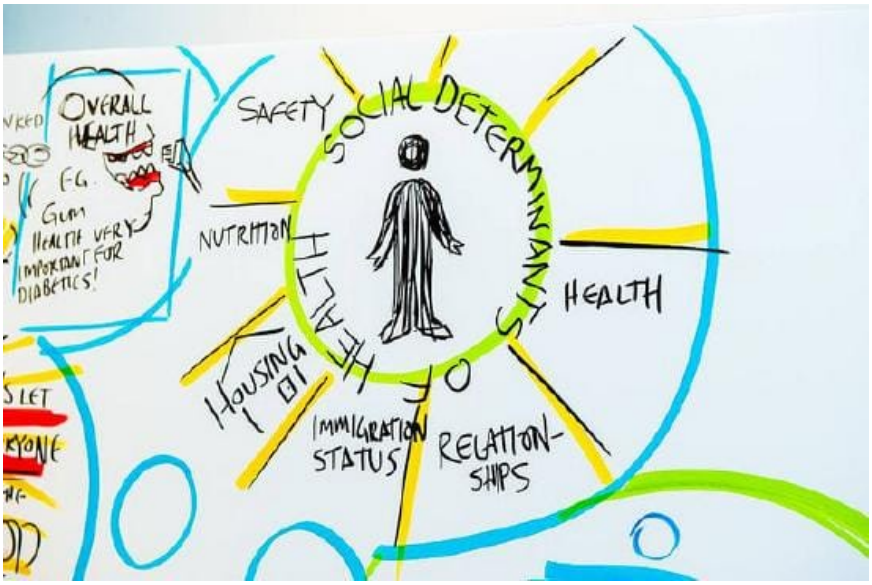


Figure 3.1.1: Image of a person surrounded by factors that could influence their health, from the graphic recording of a community meeting (CC BY 2.0; Jonny Goldstein via https://www.flickr.com/photos/jonnyg...in/26810757964)

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3.2: What are "social determinants of health?"

A determinant of health is something that *leads* to health – or the lack of health.

There are different types of determinants of health – a person's genetics, for example, can be an important determinant of their health -- a BIOLOGICAL determinant.

- **Biological** determinant of health -- something that arises from one's "gestational endowment" or a strictly biological source



- **Behavioral** determinant of health -- something that one does personally that affects health -- these may be shaped by social conditions (social determinants) or sometimes by biological determinants (like a genetic predisposition)
- **Social** determinants of health -- the influence social conditions, societal decisions, and public policies or practices

> The emphasis is on "social" – but not in the sense of "having a great social life" or social friendships. We mean "social" in the sense of "**societal**".

When we discuss the **social determinants of health**, this refers to social, economic, political and even environmental conditions that can lead to certain health outcomes, across a population. The social determinants of health include societal policies, practices and programs that affect health. As a society, we have a responsibility toward the health and well-being of all members of our society.

Keep in mind that public health looks at the health of *populations* – we will be discussing trends across **groups of people**, and the statistics of health outcomes for various **populations**.

Of course, there are individual exceptions to these trends. Lots of them! A rich person may die young, a poor person may live to be 108. Nonetheless, statistics speak to the predominant experience of communities.

Social determinants can interact with biological or genetic determinants. For example, if a person has a disability, the disability itself (a biological condition) may affect their health and life expectancy - that's biological, not social. The way society *treats* disabled people, however, is a social determinant of health, which has an independent effect on the health of the disabled population.

For starters, here are two very important things to understand about health, drawn from the handout "Ten Things To Know About Health" produced by California Newsreel as an accompaniment to Unnatural Causes, a video series. We will see part of the series in this Lesson and later modules.

1. Health is more than health care. Doctors treat us when we're ill, but what makes us healthy or sick in the first place? Research shows that social conditions – the jobs we do, the money we're paid, the schools we attend, the neighborhoods we live in – are as important to health as our genes, our behaviors and even our medical care. One quote you will hear in the video this week, that illustrates this well:

ICHIRO KAWACHI (health researcher featured in this week's video): Health care can deal with the diseases and illnesses. But a lack of health care is not the cause of illness and disease. It is like saying that since aspirin cures a fever that the lack of aspirin must be the cause of the fever.

2. Health is tied to the distribution of resources. The single strongest predictor of our health is our position on the class pyramid. Whether measured by income, schooling or occupation, those at the top have the most power and resources and on average live longer and healthier lives. Those at the bottom are most disempowered and get sicker and die younger. The rest of us fall somewhere in between. On average, people in the middle are twice as likely to die an early death compared to those at the top; those on the bottom, four times as likely. Even among people who smoke, poor smokers have a greater risk of premature death than rich ones.

NICHOLAS CHRISTAKIS (researcher on children's development, featured in this week's video): Most people can quite readily appreciate the fact that if you have more money you're going to be healthier. But it also turns out that that observation holds not just at the extremes. So, for example, let's say that there's a ladder. It's not just that the rich differ in some way from the poor in some kind of black-white or yes-no or zero-one kind of way. There's a fine gradation all the way along this ladder, both in wealth and in health.

Questions for Reflection:

1. What about these two facts might be surprising to you or others?
2. Which do you think has a bigger effect on one's health – one's diet or one's income? Why?
3. Read the following quote from Tony Iton, former Director of Public Health for Alameda County, California, and think about the various neighborhoods near where you live. Can you picture examples of what he is referring to? What is your reaction to the quote?

TONY ITON: "We can predict on aggregate, based on where somebody lives, high school graduation rates, and their income, how long they will live and when they will die. Now, obviously there'll be exceptions to that, but for the most part we'll be right. And we should not be able to do that. Your life expectancy, how long you will live, should not be dependent on, essentially, the resources you have accessible to you."

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3.3: Healthy People 2030 and the Social Determinants of Health

In the United States, national goals and benchmarks for health are set through a collaborative process, about every ten years, since 1979. **The current set of goals and benchmarks (or indicators) and plans for action is called Healthy People 2030 (or HP 2030)**. The previous plan was HP 2020, and you may still see reference to that plan in our textbook and in some of the Lessons. (Before that was HP 2010, and HP 2000, and HP 1990!)

While the purpose has always been to have a population that lives long, healthy lives, since 2010 the Healthy People framework has recognized the social determinants of health is an important component.

WHO Definition of Health

Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. WHO Constitution

Healthy People 2030 Overarching Goals

- Attain healthy, thriving lives and well-being, free of preventable disease, disability, injury and premature death.
- Eliminate health disparities, achieve health equity, and attain health literacy to improve the health and well-being of all.
- Create social, physical, and economic environments that promote attaining full potential for health and well-being for all.
- Promote healthy development, healthy behaviors and well-being across all life stages.
- Engage leadership, key constituents, and the public across multiple sectors to take action and design policies that improve the health and well-being of all.

Question for reflection: How do each of these goals relate to the social determinants of health?

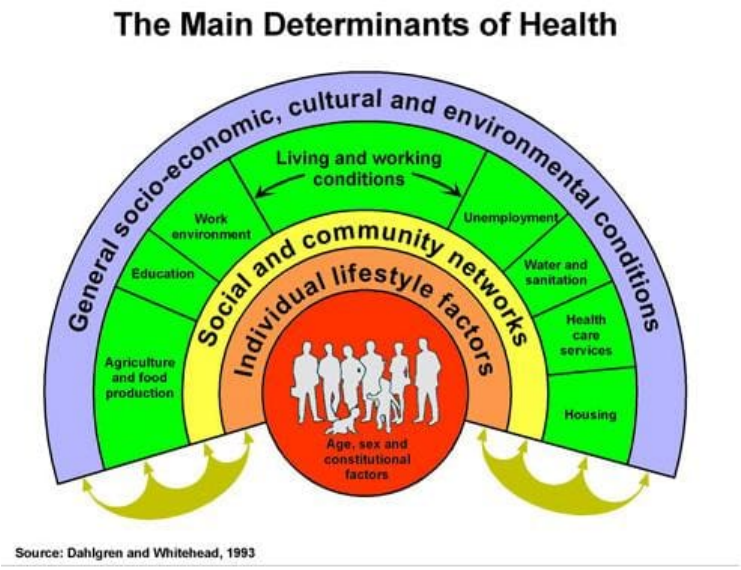


Diagram of social determinants with people at the center and factors influencing their health around them (public domain).

To map out a way to actually reach these goals, HP 2030 identifies core topics and objectives for each topic. For example, one objective is to reduce the number of people with tuberculosis in the U.S. HP 2030 also reviews the research on effective interventions, and they promote using effective policies and programs.

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3.4: Ecological Model and the Social Determinants

The idea of ecology, or of an eco-system, is that each part of the whole affects each other part. We saw this in Module 1. What happens in the society affects the neighborhood, and what happens in the family affects the individual, etc.

Most of the time, in the US, when people think the cause of an illness or an injury, they start with ***individual*** **actions or characteristics**.

- For example, when I get a cold, I might think, "I should have gotten more sleep this week!" A lack of sleep can affect the immune system, so I might focus on my individual actions.
- Or I might think about individual characteristics that are difficult to change, like "It's in our genes -- everyone in my family gets sick easily."



Ecological Model diagram - 4 levels as nested ovals

What the research into social determinants of health shows us, however, is that **much of the risk for disease and injury originates at the level of society and community**.

- In this simple case of a cold, the immune system plays a key part.
  - If a family lives in a community with a lot of noise or insecurity, that will affect their immune systems.
  - If a group of people experience economic instability or discrimination over time, their immune systems can be affected.
  - If a society as a whole suffers from food shortages or famine, that will depress the immune system of most people.
- In the video *Unnatural Causes*, we will see more explanation and examples of these social determinants of health.

The idea of the ecological model is that we are all interconnected. What happens around us, affects our families and our bodies.

It works the other way around too - **what we do or don't do has an effect on our circle of family and friends, our neighborhoods, or even society as a whole.**

- *Individuals* can take action to affect *community* and *society* - in fact, some research suggests **there are health benefits on a personal level when a person stands up against injustice or speaks out** - like lower blood pressure over time.
- Individuals can *develop personal habits* (like exercise or meditation) that help to offset the stresses caused by their *environment*.
- Small groups of people can *link together* to create political and social change. As Margaret Mead (anthropologist) said, "Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it's the only thing that ever has." (By "citizen" here, I take it to mean anyone who has a sense of civic engagement -- not necessarily someone with official papers as a citizen. Anyone can get involved in social change!)

(image: CDC)

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3.5: UNNATURAL CAUSES- In Sickness and In Wealth

I highly recommend the first episode of the series, ***Unnatural Causes: Is Inequality Making us Sick?*** (California Newsreel, 2008). This video -- while old -- does an extraordinary job of explaining the social determinants of health.

This video may be available through your college or city library. For those who don't have access to the whole video, especially the first episode, please view this short clip (below) and browse the Unnatural Causes website.

YouTube Video

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this YouTube Video online

Another video series by same producers:

The Raising of America

If you like the *Unnatural Causes* video, you may be interested in another series produced by California Newsreel that specifically looks at the social determinants of health in early childhood and their influence on health and well-being over a lifetime. The series is called *The Raising of America*. You can see excerpts for free on the California Newsreel website, and the full video series may be available through your library.

Website: https://raisingofamerica.org/

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3.6: Social determinants have a major impact on health.

Research (like the studies highlighted in the Unnatural Causes series) suggests that, in fact, a person's social status explains MORE about their health than their diet, whether they exercise, even whether they smoke tobacco. The evidence in the film – and in fact, the evidence in health research in general – can be grouped into two basic types: quantitative and qualitative evidence (or data).

- Quantitative data involves numbers. It helps to answer questions such as, how much? How many? How often? How big is the difference? How much is something increasing or decreasing?

- Qualitative data involves descriptions. It helps to answer questions such as, Why? How? What's that like?

The data gathered on health conditions vs. education and income in the various council districts of Louisville are quantitative data. At times in the video, this data was shown in a bar graph, indicating a correlation between a social variable (wealth, income or education) and a health variable (rates of heart disease, diabetes, cancer). This type of correlation is often called a "**dose-response relationship**." This means the data shows that the more exposure someone gets to one factor (the "dose"), the more effect or response we see in another factor (the "response").



Chart showing a correlation between income and having good health

For example, if you have a headache, you might expect that taking two aspirins will be more effective for soothing your headache than just one aspirin – you expect there to be a relationship between the dose and the response. A dose-response relationship is ONE of several important criteria that scientists use to decide whether an exposure ***causes***a certain health response (you will see this in Chapter 3 of your textbook).

In the case of social determinants, many studies have shown that socioeconomic status (income, home-ownership, education, wealth, job status, etc.) has a **consistent and predictable effect on health,** in many different ways. We find the same thing across different studies - whether they look at salaries or home ownership, and whether they look at cancer or heart disease. Not EVERY illness shows this relationship to social determinants, but many do.

Certainly during the **Covid-19 pandemic**, we have seen how social conditions affect who gets exposed to the virus and who gets seriously ill.

- Holding a job in healthcare or in "frontline" services like grocery stores, restaurants, and transportation puts people at much greater risk of being EXPOSED to the virus. In San Francisco, one 2020 study by UCSF found that line cooks in restaurants are especially likely to get Covid, when compared to other workers under the age of 65.
- Living in crowded conditions means that the virus is more likely to spread. Often, extended families live together in multigenerational households, and when younger members of the family work and get exposed to the virus, they inadvertently spread it to older adults in the home, who are more vulnerable to the disease.
- Living in polluted locations also correlates to a greater risk of developing serious lung diseases, including Covid-19.

The video also includes a lot of qualitative data. For example, the video used the four life stories to show how "wealth equals health" - the life stories of Jim Taylor, the hospital CEO; Tondra Young, the lab supervisor; Corey Anderson, the environmental

services worker; and Mary Turner, who is unemployed. These stories put “meat on the bones” of the statistics. They give us concrete examples and details that help us to understand not just what the numbers say, but what they really *mean*. Stories like these are often more memorable and have more of an emotional impact, which can motivate people to action.

Questions for Reflection:

- How do the lives of Jim Taylor, Tondra Young, Corey Anderson and Mary Turner exemplify concepts like the wealth-health gradient and the importance of power and control?
- What do you notice in the data maps of disease rates across Louisville?
- What might explain the differences you see?

(image on this page from California Newsreel - it shows a chart demonstrating a correlation in survey data between income and having "very good" or "excellent" health)

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3.7: Embodiment

In discussing the social determinants of health, we have to go beyond just describing the health disparities we see. We have to begin to understand the **mechanisms** by which they happen.

Nancy Krieger, whom you saw in the video, is one of the preeminent social epidemiologists of our time. She has defined what she calls "**embodiment**" - what I tend to refer to as the way in which social inequities get into (or get written on) the body, thus biologically affecting health, or the way that "inequality gets under our skin."

Embodiment

> Krieger's definition (as quoted in a 2009 paper by Clarence Gravlee) of embodiment is as follows:
>
> Embodiment is "a concept referring to how we literally incorporate, biologically, the material and social world in which we live, from conception to death; a corollary is that no aspect of our biology can be understood absent knowledge of history and individual and societal ways of living."

How embodiment works - examples of how chronic stress affects health

In the Unnatural Causes video, we saw three major mechanisms (or ways) by which this happens:

- Cortisol effects on the cardiovascular system
- Effects of stress on the immune system
- Cortisol effects on the brain

So all three of these have to do with **cortisol**, a stress hormone. If you have access to the Video: In Sickness and In Wealth, here are some of the examples from the video, to help you review this:

Cortisol effects on the cardiovascular system	• What happens to the arteries of the macaque monkeys? • What happens to the blood pressure of workers in "low control" jobs, even when they sleep? • Review the part of *Unnatural Causes: In Sickness and In Wealth* that starts at about 27 minutes into the film
Effects of stress on the immune system	• What was the significance of the cold studies, where they put cold virus in people's noses? • Was the effect of stress short-term or long-term? • Review the part of *Unnatural Causes: In Sickness and In Wealth* that starts at about 30 minutes into the film, and another segment that starts about 38 or 38.5 minutes into the film
Cortisol effects on the brain	• What does the pediatrician Dr. Shonkoff say about the effects of stress on the developing brains of children? • Review the part of *Unnatural Causes: In Sickness and In Wealth* that starts at about 37 minutes into the film

Remember, the exposure to chronic stress is the key factor in all of these mechanisms of "embodiment". The body's stress response evolved to deal with short-term challenges (like escaping a predator) and so the stress response bathes our bodies (from the inside out) with chemicals to increase our energy to be able to "fight or flight." Today's stresses are more likely to be *chronic*. These same chemicals that are *helpful* in a short-term crisis turn *dangerous* when we are exposed to them all of the time. It is the **cumulative impact of stress over a life time** that leads to the health inequities we see in heart disease and cancer.

Questions for Reflection:
Some chronic stressors mentioned in the film are: being on guard all the time, having little control at work, living in an unsafe neighborhood, being uncertain about where food will come from, and worrying about one's children.

1. What additional stressors can you think of?
2. How does exposures to stressors—and resources available to manage them—vary with class position?
3. Describe the societal forces that create and reinforce these stressors.
4. What additional set of stressors might racism impose?
5. What *positive* resources have low-income communities developed, to cope with stress?

Optional fun activity:

This online "interactivity" lets you explore some of the social determinants of health and how they relate to your life.

References

Krieger N. 2005. Embodiment: a conceptual glossary for epidemiology. J Epidemiol Community Health 59:350–355.

California Newsreel. (2008). Unnatural Causes. https://unnaturalcauses.org/

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3.8: Inequality Itself Correlates to Worse Health

As you saw in the Unnatural Causes video, inequality itself has an impact on health -- it's not just that some people are poor and some are rich, but everyone up and down the scale is affected.

Remember the researcher who held up the ladder (seemed to be made of a couple of popsicle sticks and some play dough -- not high tech!) with the rungs farther apart and the other ladder with the rungs closer together? Right now, our society is moving the rungs farther apart -- at least in terms of income and wealth, that has been happening for the last few decades.

So what? What impact does the inequality itself have?

Richard Wilkinson's Research

To answer that, I want you to watch this brief video (a TED talk - 16 minutes long) with the **British researcher Richard Wilkinson**, as he explains the correlations he had found, on an ecological level, by comparing the level of inequality among the developed, industrialized countries of the world (the "first world") with a variety of measurements of health and wellbeing. Wilkinson has focused much of his career on the study of inequality. In the video, Dr. Wilkinson demonstrates some of the health effects of inequality.

In comparing the relatively wealthy countries (developed market democracies), or in comparing the 50 states of the U.S.A., he looks at how inequality affects various health outcomes.

- He demonstrates that it is not simply the *absolute wealth or poverty* of a place that generates good/bad health.
- After you reach a basic level of wealth, the degree of equality seems to matter more than the degree of wealth. Remember, he is not comparing a poor country like Zambia to a rich country like Sweden - he is comparing a more unequal wealthy country like Portugal to a more equal wealthy country like Denmark, or comparing different states in the US to one another.
- Wilkinson's analysis of data on a macro level (comparing entire countries or states) demonstrates that **inequality correlates to poor health.**
- Now, **proving correlation is not the same as proving causality**, as we discussed last week. Other kinds of studies are needed, to put together with these ecological (society-level) studies. Wilkinson's hypothesis that inequality drives health differences (when comparing relatively wealthy countries to one another) needs further proof before we can say with certainty that it is true. However, the pattern is quite persistent!

Wilkinson suggests that stress responses and their relationship to status in an unequal society may be the biological link between inequality and health.

One more thing you may want to know as you watch this video.

- In reading a data chart, if there is a clear relationship between the two variables (the one on the x axis and the one on the y axis), then that relationship will look like a line or sometimes a curved line.
  - For example, if you drive faster, you get home faster - one leads to the other.
- If there is NOT a clear relationship between the the two variables, then the data chart will look like a mess of dots without any line.
  - For example, if you put on a graph the number of pencils you brought to class each day compared to how many pages of reading you were assigned, you would not expect to see any relationship, so the dots would be all over the place.

Here is Wilkinson's video - with captions



Above the Noise: The Hidden Costs of Inequality

This 5-minute video from KQED's program, *Above the Noise*, does a great job of discussing how a person's subjective sense of their social status -- whether they feel like they are on the top of the ladder or the bottom -- has an effect on their health. Of

course, our subjective sense of ourselves is affected by how we are treated -- by our family, our neighborhood, our schools, our jobs, and our society. It is not *just* a psychological thing. I think this video helps us to understand Wilkinson's argument even better.



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3.9: Inequality in the United States

I summarize a few key points from a study in Wisconsin that exampled inequality and health in the US below. If you want to read a New York Times article about this research, I have linked it here. (Margot Sanger-Katz (March 30, 2015), "Income Inequality: It's Also Bad for Your Health." New York Times.)

This article reports on research done by the University of Wisconsin, in conjunction with the Robert Wood Johnson Foundation, examining **counties** in the United States. The measure of inequality they used is the same one Wilkinson used -- **how far apart are the bottom 20% of the population and the top 20% of the population in terms of income?**

The health outcome that is featured in this article is, **how likely are people to die before they turn 75?** It turns out, inequality is a pretty good way to predict life span. More inequality correlates to shorter life.

Consider these quotes from the article -- what do they say about how social determinants work?

"...people in unequal communities were more likely to die before the age of 75 than people in more equal communities, even if the average incomes were the same."

“It’s not just the level of income in a community that matters — it’s also how income is distributed,” said Bridget Catlin, the co-director of the project.

Many factors besides inequality affect health, of course. How much people smoke, whether they are obese, and the safety of air and water, among many other factors, make a difference. But the effect of inequality was statistically significant, equivalent to a difference of about 11 days of life between high- and low-inequality places.

The differences were small, but for every increment that a community became more unequal, the proportion of residents dying before the age of 75 went up. [note: think about the idea of a gradient! why is that important?]

The article mentions several **theories that could help explain the impact of inequality on health.** Consider these, and think about how they compare to the ideas you saw in the Unnatural Causes film or in the Wilkinson video. Which ones do you personally find most convincing? What kind of evidence would you expect to see (in this study or other studies) if you are right? It is possible that all three theories are at least partially correct.

- Theory 1 - "while money does tend to buy better health, it makes a bigger difference for people low on the income scale than those at the top. That means that having fewer very poor people in a community will improve average health more than having fewer very rich people will diminish it."
- Theory 2 - "places where wealthy residents can essentially buy their way out of social services may have less cohesion and investment in things like education and public health that we know affect life span."
- Theory 3 - "it’s stressful to live among people who are wealthier than you. That stress may translate into mental health problems or cardiac disease for lower-income residents of unequal places."

If you want to explore this further, check out the Robert Wood Johnson Foundation page on County Health Rankings and Roadmaps project. Data from 2022 is now posted. *Optional*

This research study did not and cannot prove *causality* -- only *correlation*. Nonetheless, when we see a consistent pattern of correlation across multiple studies, we start to wonder if there could be a causal relationship. The animal studies -- like the studies of macaque monkeys, and several studies of mice -- have helped us, at least, see a possible biological pathway through which the stress associated with lower social status could cause health problems. Yet more research is still needed to rule out other explanations.

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3.10: Making Change

While some people might react with despair at all this information, as though it's just too big a problem to fix, there are actually **a lot of reasons to have hope**.

First of all, if these determinants of health are socially constructed, we as a society CAN change how they are constructed. In fact, at many points in our history, we have made those changes.

As the video notes, a hundred years ago, life expectancy in the United States was only 48 years. We live longer and healthier lives now due to many factors – not only the advent of penicillin and vaccines, but also the 8-hour work day, public schools (universal access to K-12 education), improved water quality, and voting rights.



Consider these two quotes from the video, from two leading researchers into the social determinants of health:

SIR MICHAEL MARMOT: If these inequalities in health, this gradient in health, was a fixed property of society and never changed, then you'd say, "We're stuck." But that's not the case. The magnitude of the inequalities in health changes over time. It can get rapidly worse, and if it can get rapidly worse, it ought to be possible to make it rapidly better.

DAVID WILLIAMS: During the 1960s to early '70s, the black-white gap in income narrowed and the black-white gap on multiple indicators of health also narrowed. What this says very eloquently is that economic policy is a health policy. And when we improve economic circumstances and narrow the economic gap we improve the health.

We know for a fact that during a period of *decreased* income inequality and *increased* political influence for previously disenfranchised groups such as African Americans – the 1960's and early 1970's – these social and economic changes led to *improvements in health overall* as well as *decreased health inequities*.

Since 1980, we have seen increasing inequality in our society in terms of both economics and health. For some of you, that's your whole lifetime so far! But that doesn't mean it has to be this way.

Specific policies made this so. Specific policies can change it.

Public health departments, researchers and community organizations are working together now to transform the social determinants of health, in many ways.

Photo by Matteo Paganelli on Unsplash

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3.11: Actions that work toward equality and health

One example to consider is the community training efforts of the Center for Health Equity. This Center (mentioned in the Unnatural Causes video) works in Louisville to identify and solve local problems of health inequities.

- The Center engages residents in dialogue, encourages residents to document their concerns using photography and other methods, and aims to address those concerns.
- For example, they work to improve the kinds of food sold in corner stores.
- Can you find fresh, locally-grown organic produce at a reasonable price in *your* neighborhood?

> David Williams in the unnatural Causes, In Sickness and In Wealth video:
>
> "Social policy is health policy. Economic policy is health policy. Education policy is health policy."

In Northern California, a group of public health departments came together to examine health disparities and the social determinants of health. What they came up with was the BARHII report on Health Inequities in the Bay Area. Like in Unnatural Causes, the Bay Area public health departments examined the health of local communities, and found that where you lives affects how healthy you are.

They highlight **what public health departments can do about it**. These are some of the actions they describe:

- Work with communities on capacity building - through trainings and workshops, or through public discussions about health inequities.
- Partner with community organizing groups that are tackling things like home foreclosures, toxic waste sites, and lack of jobs.
- Improve schools and in particular find ways to prevent the epidemic of drop-outs from poor communities of color.
- Examine land use and demand a health analysis (not just an economic analysis) when big new projects - like ports, highways, bridges, factories - are being developed.
- Improve the physical environment through reducing the use of diesel fuels and controlling pollution.
- Support campaigns to increase the minimum wage, and to set a "living wage" for cities and counties so that working people can afford the basics of a healthy life.

There are many proposals regarding ways to reduce income inequality floating around in US politics now -- for instance, raising taxes on those with incomes over $10 million a year, raising the minimum wage, or incentivizing the creation of better-paying jobs. The "Green New Deal" is one such idea, proposed by Rep. Alexandria Ocasio-Cortez. What have you heard about these proposals? What do you think might work? (You can respond in this week's Discussion.)

Want to hear about a local initiative that made a big impact on educational outcomes -- which are closely linked to heatlh? Change happening right here in San Francisco! This was something small -- adding an ethnic studies class in 9th grade -- that had a big impact. You can listen to this OPTIONAL interview I did with David Ko, a Teacher at Washington High, and Emily Penner, a Stanford University researcher, talking about the surprising results they found. Action toward equality sometimes can be huge (the Civil Rights Movement), and other times can be quite small and local, yet still have a big effect. **LISTEN (*optional*):**



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3.12: Making Changes to the Social Determinants Benefits Health

It can be discouraging to realize how large the impact of social determinants of health are, especially when it is quite difficult to eradicate such pervasive systems as racism, sexism, heterosexism, transphobia, xenophobia, etc. from our society. The work to overcome oppression is vital work -- but can we see some improvements in community health and some reduction of health inequities, even if we don't eliminate oppression?

The good news is, YES -- we can reduce or even eliminate health inequities through good public policy, even if we don't live in a Utopia. The fact that social determinants are SOCIAL means we can change them as a society -- and we can make improvements, even when we don't reach perfect equity.

Here are some examples of good public policy reducing health inequities and improving community health.

- The Affordable Care Act has led to a decrease in health inequities regarding ovarian cancer -- with African American women now being more likely to diagnosed earlier and to get treatment promptly after diagnosis. This should lead to a narrowing of the gap in survival rates, too, over time.
- While stark health inequities remain between African Americans and white Americans on average, there has been a narrowing of some of the gaps. When looking at all ages and all causes of death, the gap in the death rate comparing African Americans to whites has narrowed -- from 33% higher death rate in 1999 to 16% higher death rate in 2015. When looking only at those over age 65, there is now *no inequity* in death rate or in heart disease rate between African Americans and Whites. However, African Americans do still develop chronic disease (including heart disease) at an earlier age than whites, on average.
- Other programs have had success with addressing some of the lesser-known determinants, like social isolation. Social isolation is a risk factor for depression, chronic disease, and many other conditions, including premature death. Many people are at risk of social isolation, including older adults, people returning to the community after prison, those who experience exclusion due to sexual orientation or gender identity, and many others. Robert Wood Johnson Foundation has funded a number of projects aimed at decreasing social isolation, using peer networks, community health workers, community events, and more, in an "upstream" approach to health promotion.

Here are a few other examples -- Just in the last two years, several new federal laws have begun to reduce inequallity -- and they point to what MORE we need to do.

- The student loan forgiveness announced in August 2022 by President Joe Biden will primarily go to households earning under $75,000 a year, providing a boost to poor and middle class households. And linking monthly payments to 5% of payments will help long-term. However, we still need to do something about the high cost of education!

- The infrastructure bill can be used to invest in low-income communities and neighborhoods. Racial and economic justice need to part of the planning efforts -- otherwise, poorer communities and communities of color could be at a disadvantage. The law actually requires consultation with communities -- and communities are going to have to hold the institutions accountable so they follow through.
- The child tax credit that was part of the American Rescue Plan (passed early in the Biden Administration) cut child poverty in half in one year. It cut the rate in half! Tragically, that tax credit is expired in 2021, and the Build Back Better bill that would have continued it has not passed. This is something we know works to help shrink the inequality gap -- we need to fight to get it established permanently.
- The Inflation Reduction Act -- mainly a climate and healthcare bill, actually -- also works to reduce economic inequality by extending a more fair structure of healthcare premiums. Working class and middle class families benefit. You might not notice it, because this was mainly preventing premiums going up to where they were before 2021 instead of lowering them further -- but it does actually save people in the working class and middle class a bundle.
- The stimulus checks that reached families under both the Trump Administration and the Biden Administration helped a lot of people stay afloat during the economic upheaval of the pandemic.

I put in all these examples and the case studies to show that it IS possible to make changes. Never enough, perhaps -- but we still can make changes that help address health inequities and the social determinants of health.

Case Studies

In the Discussion this week, you'll see linked a number of Case Studies -- some focused on community-based organizations and others on public health departments.

One of your options for your Discussion post is to read and comment on one of these case studies -- which can also serve as templates for WHAT WORKS in addressing the social determinants of health.

Community Based Projects

- communities taking action (Links to an external site.)
- Birth Justice profile (Links to an external site.)
- Jobs with Justice profile (Links to an external site.)

Public Health Departments

- Shasta County (Links to an external site.)
- Sonoma County (Links to an external site.)
- Los Angeles County (Links to an external site.)
- Alameda County (Links to an external site.)

Want to learn more about Social Determinants?

In 2016, I had a sabbatical and researched some new materials for teaching about the social determinants of health. I didn't find an introductory or overview video better than *Unnatural Causes*, so I'm still using it, even though it is 10 years old or more now. But I did find some excellent case studies and other tools for understanding different aspects of the social determinants of health! You can see the materials i collected (for me and other teachers) at the Teaching the Social Determinants website I developed.

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3.13: Change Can Happen

Sometimes when I teach about the health effects of poverty, income inequality, racism, neighborhood segregation, etc., it can seem daunting, even hopeless -- because it's unlikely that we will entirely eliminate poverty, etc. in our lifetimes!

But here's the thing -- it's not an on/off switch with only two settings! There are MANY things we can do to reduce the social determinants of health. And the effects of more equitable POLICIES is visible almost right away. Here are a few recent examples:

Stockton, California experiment with guaranteed basic income

In Stockton, California, households received a "guaranteed basic income" of $500/month in a recent experiment on ways to fight poverty. This was 2018 or 2019. Results? Improved nutrition, improved school attendance, less depression and anxiety, all sorts of immediate health effects. The fear of economic conservatives is that "free money" will lead to people not working -- but in Stockton, people often began working more. Why? They could fix their car to get to a job interview, they could risk going for a better job without going hungry, they were less stressed and therefore able to look for new work.

Short optional video about the Stockton experiment (with transcript). This one is pretty cool to watch!

Expanded Child Tax Credit in 2021

In the 2021 stimulus bill passed early in Joe Biden's presidency in response to the covid pandemic, the Child Tax Credit was expanded for a limited time to nearly all families with children, middle class or poorer. This put $200-350/month per kid in the hands of families, regardless of whether they made enough money to owe taxes. (There was already a Child Tax Credit before 2021 that was smaller, and mainly applies to families who earn enough money to owe federal taxes -- that one is still in effect now.) For a short time -- less than a year -- families got this big boost in income. The effect? Child poverty in the US was reduced by about half! - 2.9 million children were lifted above the poverty line. Child nutrition improved. Parental depression and anxiety reduced. The Biden Administration planned to make this expanded tax credit permanent in the "Build Back Better" bill, but that did not pass -- in part, because economic conservatives were concerned it would lead to adults working less. (I guess they didn't look at the data from Stockton!)

If you want to read more about the Expanded Child Tax Credit of 2021, here are a couple of sources -- all just optional, not expected.

- Center on Budget and Policy Prioirities article, Gains from Child Tax Credit...
- Census report on the impact of the 2021 expanded child tax credit on child poverty

Policy shapes where you live -- and sometimes that matters more than income

This is a nerdy Politico article I recently came across, and I think it's fascinating! (Yeah, I'm that kind of nerd.) Regions of the US with a deeper history of suffering from inequity -- including the deep South, the extended Appalachian region, and Native American communities -- have lower life expectancy than other regions of the country. That's not news -- but what IS news is that when you compare a rich county in New England or West Coast to a rich county in the South, or a poor county to a poor county, the effect of region goes beyond money. That is, a poor county in New England likely has a higher life expectancy than a rich county in the Deep South. So, the social determinant here is NOT just individual income. More progressive local and state policies can increase access to food, improve schooling, and otherwise reduce stress -- even though we know that the West Coast and New England have housing shortages and other issues. Racial disparities also varied a lot in size across regions, showing that we CAN make policy that is more equitable. Policy makes a difference. Community attitudes make a difference. We can work toward better policies that extend years of life and quality of life, and that go farther than we have yet (in any region) to reduce or eliminate disparities.

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3.14: SUPPLEMENTAL READING ON SOCIAL DETERMINANTS AFFECTING HEALTH OUTCOMES

This supplemental section provides an overview of several specific social determinants of health -- such as poverty, economic stability, education, and neighborhood quality. This allows you, the reader, a deeper dive into understanding how these determinants affect health and what can be done about it. This section is drawn from the Open Stax textbook, *Population Health for Nurses*, and therefore the emphasis is on what nurses can do about these social factors affecting health. Keep in mind that many nurses work in or with public health departments, and many other public health workers collaborate with nurses, so I think this information will be relevant to a broader swath of public health workers.

3.14.1: Introduction

3.14.2: Economic Stability

3.14.3: Neighborhood and Built Environment

3.14.4: Educational Environment, Access, and Quality

3.14.5: Social and Community Context

3.14.6: The Cumulative Effect of Inequalities on Health

3.14.7: Chapter Summary

3.14.8: Key Terms

3.14.9: Review Questions

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3.14.1: Introduction



Figure 8.1: In some impoverished neighborhoods, the only operating businesses sell mainly soda, candy, and cigarettes. (credit: modification of work “No Loitering” by Paul Sableman/Flickr, CC BY 2.0)

In the United States, clinical care accounts for only 20 percent of a person’s health outcomes (Whitman et al., 2022). The remaining 80 percent are attributed to social and economic factors, health behaviors, and the physical environment. This means that 80 percent of health outcomes relate to one’s income, education level, employment, neighborhood environment, and health behaviors. Putting it plainly, a person’s zip code is a better predictor of their overall health than their genetic code.

Healthy People 2030 defines the social determinants of health (SDOH) as “the conditions in the environments where people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks” (Office of Disease Prevention and Health Promotion [ODPHP], 2020v, para. 1). They are the nonmedical factors that impact health outcomes (CDC, 2022b). Healthy People 2030 groups the SDOH into five domains: economic stability, education access and quality, health care access and quality, neighborhood and built environment, and social and community context (Figure 8.2). They are called *social determinants* of health because they operate outside of nonmodifiable (unchangeable) biological and genetic factors; instead, they are determined by social status. The SDOH have a major effect on an individual’s health and well-being. Examples include access to safe housing, exposure to discrimination or violence, income level, and language and literacy skills (ODPHP, 2020v).

The good news is that factors affecting these SDOH *are* modifiable (changeable), and health care professionals, including nurses, are at the forefront of driving positive changes in health outcomes for populations. The Future of Nursing 2020-2030 report highlights health equity as a major focus for nursing and states that achieving health equity begins with assessing the SDOH in every client encounter (Wakefield et al., 2021). The Centers for Disease Control and Prevention defines health equity as a “state in which everyone has a fair and just opportunity to attain their highest level of health” (CDC, 2022g, para. 1; MISPH, 2020). Addressing the SDOH is a key task of the professional nurse, as nursing practice is founded on the principle of social justice, the view that each individual deserves equal rights and opportunities (American Public Health Association, 2022). By incorporating assessments of the SDOH and their intersection with health outcomes, the nurse can drive positive change and support upstream interventions at the community, local, and state levels.

This chapter will follow the Healthy People 2030 outline on each of the SDOH and define what each determinant means. It will explore how each determinant correlates with health outcomes and why it is imperative for community and public health nurses to address the SDOH in practice and to advocate for social justice and change.



Figure 8.2 Social determinants of health (SDOH) are the conditions in which people are born, grow, work, live, and age and the wider set of forces and systems shaping the conditions of daily life that influence health outcomes. (credit: "Healthy People 2030 SDOH Graphic Domain Labels" by U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion, Public Domain)

Healthy People 2030: Social Determinants of Health

Healthy People 2030 features many objectives related to the SDOH. These objectives highlight the importance of "upstream" factors, conditions related to the economic, social, and physical environments, in promoting health and reducing health disparities. Health disparities are the *preventable* differences in health between groups of individuals, usually as a result of social or economic factors, geographic location, or environment. See Health Disparities for more information on this topic.

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3.14.2: Economic Stability

Learning Objectives

By the end of this section, you should be able to:

- Discuss the relationship between poverty and economic insecurity.
- Describe the impact of employment on economic stability.
- Explain how housing instability contributes to economic insecurity.
- Describe the link between a person's socioeconomic position and their health.

Economic stability in the context of the SDOH refers to the ability to access necessary resources and care to promote healthy living. It requires having a steady source of income with stable employment that is safe from occupational-related health risks. The necessary resources include the ability to afford quality housing in a safe neighborhood with access to clean air and water, transportation, and healthy food options.

In the context of an individual or a family, economic stability refers to a situation where the individual has a steady source of income and regular access to resources that are essential for a healthy life, such as food, clothing, housing, transportation, child care, and health insurance. A consistent income is one key to economic stability at the individual and family levels. Individuals with steady employment are less likely to experience economic insecurity (ODPHP, 2020a).

Consistently earning a living wage is another critical component of economic stability that directly correlates with what an individual can afford to live a healthy life. A living wage is one that affords a modest standard of living for the individual and family (Global Living Wage Coalition, 2018). The federal minimum wage is far below what is generally considered necessary for a family to survive; that is, it is less than a living wage (Glasmeier, 2023). The federal minimum wage rate has not kept pace with inflation and other cost-of-living adjustments that disproportionately impact Black, Indigenous, and people of color (BIPOC) individuals (Khan & Khattar, 2022). The last update to the federal minimum wage occurred in 2009, when it was increased to $7.25 per hour. Twenty states currently use the federal minimum wage. The ability to afford housing, food, child care, transportation, and health insurance affects an individual's economic or financial stability (ODPHP, 2020a; Rural Health Information Hub [RHIhub], 2020a). A goal of Healthy People 2030 is to "help people earn steady incomes that allow them to meet their health needs" (ODPHP, 2020a, para. 1).

Poverty

Economic insecurity is when an individual or family cannot consistently afford housing, food, clothing, transportation, child care, or health care. Economic insecurity is directly linked to poverty, a state in which an individual lacks a socially acceptable amount of money or possessions (Merriam-Webster, 2023). In 2021, almost 38 million individuals, close to 12 percent of the population, lived in poverty in the United States (Creamer et al., 2022). Individuals and families living in poverty cannot afford the resources essential to living a healthy life (ODPHP, 2020a). Economic insecurity is also associated with unemployment, underemployment (willing but unable to find full-time work), and low-wage employment. Many individuals with stable work still do not earn enough income to afford the resources necessary for good health (ODPHP, 2020a). Almost one in every three individuals in the United States is considered economically insecure, with incomes below 200 percent of the federal poverty level (Langston, 2018). The groups most affected are BIPOC communities, which comprise slightly more than half of the individuals who are economically insecure (Langston, 2018).

The socioeconomic gradient is another term for the relationship between income and health, namely, the association between low socioeconomic position (SEP) and increased disease risk and premature death (Bonaccio, et al., 2020). SEP refers to one's position in society based on social and economic factors of income, education, and employment. Individuals living with economic insecurity often cannot access resources that support healthy and quality living. These resources, along with economic stability, are what comprise the SDOH: stable housing, safe neighborhoods, access to healthy and affordable foods, and access to quality education. Living with economic insecurity makes it difficult to attain and sustain the determinants of health, thereby perpetuating a cycle of poverty, economic and housing instability, food insecurity, and a lack of access to educational and employment opportunities. This contributes further to income inequality and insecurity and results in a multitude of negative health outcomes (ODPHP, 2020b).

The U.S. Census Bureau (USCB) determines poverty levels by using a set of income thresholds that vary by family composition. If a family's total income is less than the set family threshold, that family and each individual in it are considered to be living in poverty (USCB, 2023). The official poverty definition uses income before taxes and does not include noncash benefits such as public housing, food stamps, tax credits, and Medicaid benefits (USCB, 2023). In 2021, the federal designation of poverty for an individual was an income under $12,880 per year, and for a household (family of four) it was an income under $26,500 per year (ODPHP, 2020b). According to the U.S. Department of Housing and Urban Development (USDHUD), regardless of the location, a family of four with one adult employed full-time at the federal minimum wage rate is unable to afford fair-market rent for a two-bedroom apartment (Habitat for Humanity, 2023). Families who live in poverty cannot consistently afford quality housing, food, health care, and other necessities.

Poverty is cyclical and often persists for long periods of time. Research supports the concept of generational poverty, the phenomenon of persistent poverty and disadvantage where children who grow up poor, regardless of race, are more likely to be poor as adults (Wagmiller & Adelman, 2009). In many cases, the foundation of poverty can be traced to structural discrimination and racism that contribute to inequitable social and economic opportunities (ODPHP, 2020b). These deeply rooted practices and beliefs propagate the pervasive unjust treatment and oppression of BIPOC individuals (Braveman et al., 2022; see Structural Racism and Systemic Inequities). Individuals living in poverty or within impoverished communities lack equal access to the resources necessary for healthy living, such as safe, quality, stable housing and healthy food options. In the United States, BIPOC individuals living in rural areas and individuals living with disabilities are at higher risk for living in poverty.

Living in poverty has been directly linked with poor health outcomes. Those living in poverty or with limited finances may have difficulty accessing care due to the costs of health insurance, medications, and provider visits. Living in impoverished communities with limited access to healthy foods impacts health outcomes related to metabolic diseases, cardiovascular diseases, and diabetes. Living with the daily stressors of poverty and having to make difficult decisions such as *pay the rent* or *purchase food* increases stress levels and negatively affects mental and cardiovascular health while also negatively influencing health behaviors. Adults living in poverty are at higher risk for adverse health outcomes from smoking, substance use, and chronic stress. Poverty in childhood is associated with developmental delays, toxic stress, chronic illness, and nutritional issues. Mortality rates are higher and life expectancy is lower for impoverished individuals, families, and communities. In the United States, individuals who earn the top 1 percent of income (meaning they make more than almost everyone else) live 10 to 15 years longer than individuals who earn the bottom 1 percent of income (ODPHP, 2020b). For individuals living in poverty, economic insecurity is a constant health threat.

Employment

Employment is a main driver of individual economic stability. Stable employment is associated with lower levels of poverty and overall better health. A job's demands, the work environment, compensation, and the security of the work all affect an individual's health status (ODPHP, 2020u). Individuals may be out of the workforce (retired or unable to work), employed (working for pay), unemployed (not working but looking for work), or underemployed (involuntary part-time work, intermittent work, poverty-wage work). A lack of employment and underemployment are associated with poverty and economic insecurity. Studies have linked illness and premature death, and a delay or absence in receiving necessary medical care and prescriptions, with unemployment in adults (Kansas Department of Health and Environment, 2015). Individuals who are unemployed have higher rates of depression, anxiety, and low self-esteem along with a sense of demoralization. In addition to psychological harm, some of these individuals experience stress-related issues such as hypertension, heart disease, and arthritis and may also experience a stroke or myocardial infarction (ODPHP, 2020u).

An individual's physical work environment is an important factor in their general health. Repetitive lifting, pulling, or pushing heavy items, exposure to chemicals, or loud noises can all cause significant injury and illness to workers (ODPHP, 2020u). Time off from work often follows an injury or illness, which can further tip an individual into economic insecurity. Highly demanding jobs, high levels of conflict within the workplace, long workdays, having multiple jobs, and working evening shifts are also associated with psychological stress. These workplace stressors place individuals at risk for depression, strained caregiver-child relationships, and unhealthy coping mechanisms such as misusing alcohol or smoking cigarettes (ODPHP, 2020u). Migrant workers are at particular risk; see Caring for Vulnerable Populations and Communities for more details.

Disparities in employment have been correlated with race and ethnic background, gender, and level of educational attainment (ODPHP, 2020u). These disparities negatively impact economic stability and further perpetuate the cycle of poverty. For example, BIPOC individuals are more likely to work in lower-paying blue-collar service jobs and environments with greater exposure to the environmental risk factors described above while White individuals are more likely to work in office jobs and assume managerial positions (ODPHP, 2020u). These exposures place BIPOC individuals at higher risk for injury, illness, anxiety, and depression (ODPHP, 2020u). While the pay gap between women and men in the United States has narrowed somewhat in recent years,

in 2020, women earned 83 cents for every dollar earned by men (Wisniewski, 2022). This gap in pay equity between genders negatively affects the economic stability of women and families.

Educational level affects the type of work individuals engage in, the working conditions they experience, and compensation levels. Individuals with lower levels of education generally have fewer job choices and may be forced to accept undesirable positions and low wages. These individuals are more likely to have more physically demanding jobs that may expose them to harmful toxins (ODPHP, 2020u). Many factors may contribute to lower educational attainment, including growing up in poverty with unequal access to educational opportunities.

The Opportunity Atlas

At this interactive website, The Opportunity Atlas, you can click on a map to find out which U.S. neighborhoods offer children the best chance to rise out of poverty. You can trace the roots of today's affluence and poverty back to the neighborhoods where people grew up. The atlas allows users to search by location, outcome, and demographic group.

Explore the atlas, and then respond to the following questions.

1. What question(s) did you use to explore the Atlas?
2. What do the areas where household income at age 35 is highest seem to have in common? What about those areas where household income is lowest? And what about those where income falls somewhere in the middle? Thinking about other aspects of these regions, consider what it is about the regions—based solely on geography—that might relate to these outcomes.
3. Pick one of the articles on the map (indicated by an open book icon) and explore what you find at that link. How does this add to your understanding of poverty and opportunity?

Housing Instability

Affordable housing is another driver of economic stability, whereas housing instability is correlated with economic insecurity. Individuals and families who encounter difficulty paying rent, live in overcrowded residences, move frequently, or spend a large part of their household income on housing are experiencing housing instability.

Households are cost burdened if they spend more than 30 percent of their income on housing, and they are severely cost burdened if they spend more than 50 percent on housing (ODPHP, 2020s). After paying rent, these households are left with little to spend on other necessities such as food, clothing, utilities, and health care. BIPOC households are almost twice as likely as White households to be cost burdened (ODPHP, 2020u). In 2019, there were over 37 million cost-burdened households in the United States, almost 18 million of which were severely cost burdened. Cost-burdened households are at risk for housing instability (ODPHP, 2020u). Substandard or inferior housing is associated with health risks such as asthma, allergies, mental health conditions, and respiratory illnesses related to vermin, mold, water leaks, and inadequate heating and cooling systems (CDC, 2009).

Interactivity: Spent

In the interactivity Spent, you begin by losing your job, life savings, and house. Down to your last $1,000, you must make it through the month by making a series of difficult decisions as you watch your savings dwindle. While this activity is set up as a game, poverty is not something you can simply stop playing, and many Americans make decisions like those in this interactive simulation daily to survive.

Walk through the interactivity, and then respond to the following questions.

1. What factors did you weigh as you decided how to spend your money?
2. What, if anything, surprised you as you made your choices?

Being cost burdened puts individuals and families at risk for foreclosure or eviction. Renters who are evicted or forced to move often relocate to poorer and less safe neighborhoods (ODPHP, 2020u). Researchers have correlated children who experience multiple housing moves in a year with poor physical health and lack of consistent health insurance coverage. If families must

move frequently, building community relationships and attachments is more difficult. Community attachments can be protective for individuals experiencing adversity. For example, research has indicated that individuals living in higher-income areas report better health than those living in lower-income areas (ODPHP, 2020u).

Severe housing instability may result in homelessness, a state where individuals lack a nighttime residence (Figure 8.3). The USDHUD Annual Homelessness Assessment Report to Congress found that an estimated 582,500 individuals were experiencing homelessness on a single night in 2022 (USDHUD, 2022). This equates to 18 of every 10,000 individuals in the United States experiencing homelessness. Compared to the overall U.S. population, BIPOC communities continue to be overrepresented among the population experiencing homelessness (USDHUD, 2022). Individuals experiencing homelessness have an increased risk of premature death. In Massachusetts, the mortality rate of individuals ages 25 to 44 experiencing homelessness was approximately ten times higher than that of the general population. A study of individuals experiencing homelessness in the New York City shelter system found that over 50 percent had a substance use disorder, 17 percent had hypertension, 17 percent had asthma, and 35 percent were experiencing major depression, correlating the negative impact of housing instability with homelessness. Children who are homeless are at risk of cognitive and mental health problems, asthma, physical injury and assaults, and poor school performance. Housing instability has broad implications for the development and future of these children (USDHUD, 2022). See Caring for Vulnerable Populations and Communities for more information about homelessness.



Figure 8.3 An individual experiencing homelessness is at risk for health issues related to inadequate nutrition and exposure to violence, communicable disease, and weather. (credit: “homeless” by Golfeser/Flickr, Public Domain)

Theory in Action: Moving to Opportunity

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this YouTube Video online

Neighborhoods make a difference in the health and well-being of residents. In this video, Harvard professors Nathan Hendren and Edward L. Glaeser discuss the Moving to Opportunity (MTO) program, which assessed the outcomes of moving families with young children out of high-poverty housing projects into lower-poverty neighborhoods (ODPHP, 2020u). The program found that the children of families who moved to low-poverty neighborhoods before the age of 12 were more likely than children who didn’t move or children who moved after the age of 12 to go to college, have higher incomes, and live in better neighborhoods as adults. The women of these families also had improved health outcomes, with lower levels of obesity and diabetes (Abdul Latif Jameel Poverty Action Lab, n.d.).

Watch the video, and then respond to the following questions.

1. According to the research presented, where in the United States do children have the best chance of upward mobility? Where do they have the worst chance? Why do you think this is so?
2. Why do you think children who were under age 12 when their families moved to neighborhoods with lower poverty rates fared better economically as adults than children who were older when they moved to these same neighborhoods?

Case Reflection: Housing Instability

Read the scenario, and then respond to the questions that follow.

Serena Jordan is a 42-year-old woman who is married with three children, ages three, five, and nine. She works full-time as an administrative assistant at an insurance company. Her husband is a truck driver and is often gone for weeks at a time on the road. They do not have any family nearby, but they rent a second-floor apartment in an old three-family home and have made friends with the neighbors who live on the third floor. The neighbors, an older couple, sometimes help watch the children when Serena is in a pinch. Serena's family lives paycheck to paycheck, and though she works 40 hours a week, Serena is always worried about being able to pay the bills. Currently, she earns $13/hour, and her husband brings home a salary of $50,000/year, but with the three children, day care expenses, rent, grocery bills, car payments, and medical bills, it never seems to be enough. The family spends almost $2,000 a month on rent, leaving them cost burdened.

1. Why do you think many people in the United States are experiencing similar situations to those Serena and her family are experiencing?
2. What are some interventions the community health nurse can do to assist Serena and her family?

The Role of the Nurse in Addressing Economic Instability

Nurses need to assess for poverty in all their clients, regardless of appearance or health insurance status. This assessment can be a written questionnaire or an in-person conversation. It might be as simple as asking, "Do you sometimes have to skimp on purchasing groceries to pay your rent? Do you feel you have all the resources necessary?" Often, nurses do not want to ask these questions in case a client answers "No," as they do not have a solution or they feel the problem is too big for one person to solve. However, the first step in the nursing process is always assessment. Nurses need to be able to ascertain this information as a part of the total health assessment to collect data and then formulate a plan. Nursing can significantly impact individuals, families, and communities living in poverty by raising awareness of the prevalence of poverty and its associated negative health outcomes. By raising awareness, nurses can advocate for allocating more resources, such as increased tax credits for families, free early education programs for young children, and better food assistance programs. Community health nurses who assess for housing instability and collect relevant data can intervene with referrals to housing support programs and subsidies that can provide low-income families with financial and housing assistance. Additionally, nurses can advocate for a living wage for everyone by promoting the health and societal benefits of improving conditions for impoverished communities.

Community health nurses can be essential in promoting safe physical work environments to address employment-related health disparities. Nurses should screen all their clients for physical and psychological work-related hazards to formulate an appropriate care plan. They can also work with local and state officials and business owners to advocate for employee benefits and resources such as health insurance, paid sick leave, and parental leave. Community health nurses can also advocate at the local, state, and federal levels for employment programs, free educational training programs, or degree programs for lower-income individuals who wish to further their education, obtain career counseling, and seek access to affordable, quality child care. Nurses specializing in occupational health often work in tandem with corporations to promote healthy work environments. Their role is to protect workers from physical injury related to repetitive lifting or poor ergonomic design and exposure to harmful chemicals and loud noises.

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3.14.3: Neighborhood and Built Environment

Learning Objectives

By the end of this section, you should be able to:

- Explain the link between food insecurity and food deserts.
- Describe the relationship between crime and violence and health outcomes.
- Define the term *built environment*.
- Examine how the built environment influences health.
- Assess the effect of housing and environment on health.
- Explain how environmental conditions impact population health.

Healthy People 2030 objectives focus on creating neighborhoods and environments that promote the health and safety of the places in which individuals live, work, learn, and play (ODPHP, 2020b). The neighborhoods where people reside have a major impact on their health and well-being.

Food Access

Nutritious foods are an essential component of a healthy diet. Vegetables, fruits, whole grains, low-fat dairy, protein, and oils are all nutritious foods when consumed in healthy portion sizes. Healthy eating habits, defined as eating a variety of nutrient-dense foods and beverages across all food groups within calorie limits, can lower the risk of chronic disease. Foods and beverages with added sugars, saturated fat, and sodium, along with alcoholic beverages, are associated with unhealthy diets. Research has consistently demonstrated that healthy eating habits are associated with decreased cardiovascular disease, obesity, type 2 diabetes, and breast and colorectal cancer and improved bone health (ODPHP, 2020q). Therefore, access to healthy and affordable food is vital for health.

Often a result of economic insecurity and poverty, food insecurity is a condition in which individuals or families have limited access to adequate amounts of high-quality food (ODPHP, 2020r). Factors influencing food security include income, employment status, race, ethnicity, and disability. Food insecurity increases when income is limited or unavailable due to unemployment. In 2020, BIPOC households were more than twice as likely as the national average to struggle with food insecurity. Individuals living with disabilities are also more likely to experience food insecurity due to limited employment opportunities and health care expenses (ODPHP, 2020r). In 2020, almost 14 million U.S. households were food insecure at some point in the year, and almost 30 percent of low-income households were food insecure compared to the national average of almost 11 percent (ODPHP, 2020r). Factors influencing this disparity are thought to be related to neighborhood conditions, transportation access, and physical access to food (ODPHP, 2020r).

Healthy food choices are inaccessible in many neighborhoods because full-service grocery stores are not readily available, particularly in certain rural areas and low-income neighborhoods (ODPHP, 2020r; U.S. Department of Agriculture [USDA], 2017). These areas where residents have limited or no options for affordable and healthy foods are often termed food deserts (ODPHP, 2020r; RHIhub, 2020b; USDA, 2017). Limited access to healthy and affordable food sources, income level, transportation access, and distance are barriers to healthy food access for many Americans. Almost 13 percent of the U.S. population lives in low-income food deserts (USDA, 2017). Food deserts are common in locations with small populations and high rates of vacant or abandoned homes; in areas where residents have lower incomes, lower levels of education, and higher rates of unemployment; and disproportionately within BIPOC communities (The Annie E. Casey Foundation, 2021). Lack of transportation also contributes to food insecurity. Lack of or limited public transportation is a barrier to accessing affordable healthy food. Further contributing to health disparities among vulnerable populations, individuals experiencing disabilities, those with chronic diseases, BIPOC communities, and those living in rural areas are more likely to lack transportation to full-service supermarkets (ODPHP, 2020r).

The Food Deserts of Memphis

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View this YouTube Video online

This video explores food deserts by profiling two families living in Memphis, Tennessee. Their stories emphasize the contrast between the food choices available to the higher-income and lower-income areas within the city, highlighting the income and zip code divide with a 13-year life expectancy difference between the two parts of Memphis.

Watch the video, and then respond to the following questions.

1. How did you feel as you watched the video and listened to the stories? What, if anything, surprised you as you watched the video?
2. What is the relationship between the former practice of redlining and the current existence of food deserts?
3. What are some actions the community health nurse can take to address these food deserts?

In addition to accessibility issues, food affordability is a major obstacle, as healthier diets are more expensive than diets rich in processed and refined foods (The Annie E. Casey Foundation, 2021). Because nutrient-poor foods tend to be cheaper and more convenient to access than nutrient-dense foods, low-income individuals and families tend to rely on them. Convenience stores often have higher food prices with lower quality and less variety of foods than full-service supermarkets (ODPHP, 2020q). Residents of neighborhoods with fewer full-service supermarkets with fresh produce are at higher risk of obesity and diabetes, whereas rates of these conditions are lower among those who live in areas with increased access to grocery stores (ODPHP, 2020q). Studies have demonstrated a link between individuals experiencing food insecurity and higher rates of obesity and chronic diseases such as hypertension and heart disease. In children experiencing food insecurity, studies have demonstrated increased risks of obesity and developmental issues and even a negative impact on mental health (ODPHP, 2020r).

The Role of the Nurse in Addressing Food Access Disparities

Community health nurses play a major role in advocating for individuals experiencing food insecurity. School nurses nationwide have paved the way for free breakfast and lunch for students from low-income families via the National School Lunch Program (NSLP) (ODPHP, 2020r). School nurses, in conjunction with school administrators, are also at the forefront of promoting healthier food options for school-provided breakfast and lunch. Nurses both promote access to food and ensure that the food provided is nutritionally appropriate. This is one example of how community health nurses impact the health of the communities in which they serve.

Community health nurses often work with local food pantries to help families in need access food. Nurses can also help individuals obtain food benefits through programs such as Women, Infants, and Children (WIC) and the Supplemental Nutrition Assistance Program (SNAP) (ODPHP, 2020r). These government-sponsored programs provide food assistance to lower-income individuals and families. SNAP gives a monthly dollar amount, determined by income level, which must be used to purchase food. WIC is meant for pregnant, breastfeeding, or postpartum parents and for children under age five and provides nutrition education, breastfeeding support, and nutrient-dense foods (Benefits.gov, 2021). Community health nurses can advocate for increasing access to nutrient-dense foods in low-income neighborhoods to address food disparities and their subsequent negative impacts on health. At the policy level, public health nurses can be involved in policies to limit the number of fast-food restaurants in a community or to incentivize full-service supermarkets to expand into underserved neighborhoods.

Crime and Violence

Violence is a public health issue that adversely affects the target, any witnesses, the communities in which they live, and the perpetrator. It may include child abuse, firearm violence, intimate partner violence, sexual violence, or elder abuse. Violence has cumulative biological effects on the brain, neuroendocrine system, and immune response, resulting in increased incidence

of depression, anxiety, posttraumatic stress disorder (PTSD), and suicide and increased risk of cardiovascular disease and premature death (Rivara et al., 2019). Repeated exposure to crime and violence is linked to an increase in negative health outcomes such as asthma, hypertension, cancer, stroke, and mental disorders (ODPHP, 2020e).

Childhood exposure to violence at home, at school, online, or in the neighborhood is considered an adverse childhood experience (ACE). ACEs are traumatic events such as experiencing or witnessing violence or abuse at home or in the community, having a family member attempt suicide, or any event that undermines a child's sense of safety, security, and bonding (CDC, 2022c). ACEs are linked to lifelong negative health outcomes such as chronic disease, mental illness, and substance use problems. Additionally, research has found that ACEs can negatively impact education levels, future job opportunities, and overall earning power. Evidence also links exposure to violence in childhood to an increased risk of experiencing intimate partner violence or being violent in adulthood (USDHHS Office on Women's Health, 2021). Exposure to violence as an adult is also associated with poor health outcomes, such as mental health disorders, depression, anxiety, suicidal ideation, and physical injuries from violence (ODPHP, 2020e). See Caring for Vulnerable Populations and Communities for more information on ACEs.

Individuals who are economically insecure are more likely to live in impoverished neighborhoods that lack resources and have higher rates of crime and violence (ODPHP, 2020e). Additionally, the national homicide rate is higher for BIPOC adolescents and young adults than their White counterparts (ODPHP, 2020e). Individuals who feel unsafe in their neighborhoods are more likely to avoid community gatherings and outdoor spaces, placing them at higher risk of poor physical and mental health (ODPHP, 2020e). If a community experiences violent crime, families will likely avoid utilizing public parks and partaking in outdoor physical activity out of safety concerns. This negatively affects the family, causing increased isolation and mental health stress and decreased physical activity, socialization, and play for children.

The Role of the Nurse in Addressing Violence

Strategies for public health nurses to address crime and violence include educational programs on building resilience and developing healthy interpersonal relationships. The community health nurse can collaborate to offer school-based programs that build emotional self-awareness and regulation, problem-solving, and teamwork skills to prevent violent behavior. Such educational and training programs can occur in a community center or even an outpatient community health clinic. Building resilience and emotional self-awareness and regulation skills, even from a young age, creates a culture of accountability and can reduce violence. Community and public health nurses can also offer parenting classes to help educate families on how to model resilient behaviors and give strategies for dealing with difficult parental situations. Finally, community health nurses can work with community members to provide high-quality child care, mentoring programs for young individuals, and safe, affordable after-school programs to keep children engaged with playing and learning in a supervised environment.

Theory in Action: Family Violence Prevention: Kaiser Permanente's Innovative Model

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View this YouTube Video online

In this short video, Kaiser Permanente highlights its innovative and effective model for addressing family violence and transforming the health care response to domestic violence. Community and public health nurses are well positioned in the community to utilize this approach in assessing for intimate partner and domestic violence.

Watch the video, and then respond to the following questions.

1. How does family violence impact a community?
2. What are the components of the innovative model?
3. How might a community health or public health nurse use components of this model in their communities?

The Built Environment

A community's built environment includes transportation access and roadways, the availability of green space, locations for community gatherings, and the buildings or other physical structures within the neighborhood (ODPHP, 2020d). Almost 20 percent of economically insecure households in the United States lack access to private transportation (Langston, 2018). Low-income individuals without a vehicle are doubly burdened if they reside in neighborhoods without adequate and affordable public transportation, such as bus routes or subways. These individuals may struggle to access schools, work, health care, and other necessary resources. Economically insecure individuals, particularly those who identify as Black, Native American, and mixed/other race, are more likely than those who identify as White, Latina/Latino, or Asian or Pacific Islander to report dropping out of the labor force due to transportation issues (Langston, 2018).

The availability of outdoor green space and access to sidewalks and bike lanes have major health impacts on a community. A lack of green space for outdoor activities and community gatherings negatively affects residents' physical and mental health and well-being. Children need green space to play outside. Play is a means for children to learn and grow as individuals. It is difficult to socialize with groups of other children if play is limited to indoors only. Walking is a free and easy exercise activity, but residents may be hesitant to participate in this beneficial physical activity without a sidewalk or wide road shoulder to permit safe walking. Bike paths are also a cost-effective way to increase walking, biking, roller-skating, and other leisure activities and can serve as a means of transportation, but if there is not a safe way to engage in these physical activities, they will not occur.

Case Reflection: Addressing the Client's Neighborhood and Built Environment

Read the scenario, and then respond to the questions that follow.

As described previously, Serena and her husband are trying to meet the basic needs of their family of five while living paycheck to paycheck. Their middle child was recently diagnosed with asthma after having numerous respiratory illnesses. The health care provider has told Serena that she should remove all carpets from the house and ensure there are no pets, woodstove smoke, or second-hand tobacco smoke near her child, as these are all possible triggers for an asthma attack. Serena is very upset, as the apartment they rent has carpet in every room except the kitchen and bathroom and her first-floor neighbors are smokers. Though Serena and her husband do not smoke, they can always smell cigarette smoke in their apartment.

1. What assessments and screenings should the nurse conduct with Serena?
2. How could the nurse assist Serena in getting some much-needed resources for her child who has asthma?
3. How might a community health nurse work with Serena and her family to find strategies to improve their living environment?

The Role of the Nurse in Addressing the Built Environment

Public health nurses are well positioned to work within the local community and government to advocate for shared public green spaces. Building community partnerships is a core policy development role for a public health nurse. From a windshield assessment of the community to raising awareness at the local level and collaborating with policymakers and community leaders, public health nurses can effect positive change within the community. Working with urban design planners and city planners, nurses can advocate for the construction of playground structures, tennis or pickleball courts, and basketball courts to afford more physical activity and community-building opportunities. School nurses can also be involved in this process by advocating for more physical education and outdoor recess time at school and by advocating for more gathering places for children and families to congregate, socialize, and play after school.

Green Space Cuts Urban Crime and Depression

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View this YouTube Video online

This short video highlights how a little green space can make a big difference in low-income city neighborhoods by featuring the relationship between the environment and the health of residents living in a Philadelphia neighborhood. Community and public health nurses can be advocates and change agents, creating more green spaces in urban areas.

Watch the video, and then respond to the following questions.

1. In what ways did the neighborhood environment affect the health of its residents both before and after the Philadelphia LandCare program?
2. Where did the intervention described in the video have the biggest impact?
3. What steps can nurses take to improve the physical environment of the clients in the communities they serve?

To find out more about the LandCare program described in the video, which is now part of the Pennsylvania Horticultural Society, visit their website.

Quality of Housing

Housing quality refers to a home's physical condition and the quality of the environment (neighborhood) in which it is located. Quality housing is characterized by clean air, home safety, enough space per individual, access to heating and cooling systems, and the absence of environmental risk factors. Crowded living conditions are associated with food insecurity, infectious diseases, and poorer mental health (ODPHP, 2020k). Low-income individuals are more likely to live in older homes and homes needing maintenance and repair.

Poor housing quality and poor living conditions contribute to negative health outcomes for a variety of reasons. The presence of lead, mold, asbestos, radon, poor air quality, and overcrowding are all associated with illness and disease. Children under age six are at increased risk for adverse health outcomes due to lead exposure because their bodies are rapidly growing and developing and because they tend to put their hands and other objects into their mouths. Children can be exposed to lead from touching, swallowing, or breathing in lead dust from lead paint, pipes, and water faucets. Lead exposure can result in slowed growth and development, damage to the brain and nervous system, learning and behavioral problems, and hearing and speech issues, all of which may result in lower IQs and underperformance in school (CDC, 2022f). Many of the outcomes associated with lead exposure are permanent; for example, lead poisoning may result in infertility, hypertension, heart disease, renal disease, and even premature death (NIOSH, 2021). Even low levels of lead in the blood have been linked to negative outcomes in a child's attention span and academic achievement (CDC, 2022f).

Many modifiable environmental risk factors related to housing are associated with negative health outcomes. Water issues such as leaking are associated with mold growth, increasing the likelihood of childhood asthma and triggering asthma exacerbation. Mold is also associated with respiratory illnesses, coughing, and wheezing. Exposure to asbestos, a class of mineral fibers used in various industrial products like insulation, cement, textured paint, and shingles, may place individuals at increased risk of developing several health conditions. Asbestos in good condition is not considered harmful, but handling asbestos products may release the fibers into the air; if inhaled, they accumulate in the lungs and may cause lung cancer, asbestosis, pleural disease, and mesothelioma (Agency for Toxic Substances and Disease Registry, 2016; CDC, 2023). While most modern products do not contain asbestos, homes built before the 1970s may have asbestos, placing families living in older rental homes at higher risk of exposure to it (U.S. Consumer Product Safety Commission, n.d.). Exposure to vermin such as cockroaches and rodents causes an increased risk for developing asthma and allergies and places exposed individuals at increased risk of psychosocial distress (CDC, 2009).

The Role of the Nurse in Addressing Quality of Housing

Community health nurses can promote the overall health and well-being of an entire neighborhood and community by addressing the quality of housing. Widespread deterioration in neighborhoods can negatively impact the mental health of residents in that community. The social and economic conditions in a neighborhood affect health outcomes as much as the quality of housing, further disadvantaging low-income groups, creating even more health disparities. To fulfill their core assessment function, community and public health nurses should assess the lived experience of community members; appropriately screen for issues such as lead poisoning, mold-related illnesses, mental health illness, and communicable diseases; and then work to develop policies to address these issues. By championing new laws and regulations on housing quality and strengthening support for affordable housing, the nurse is well positioned to lead effective change. Past successes in public health efforts on quality housing include banning lead paint products and creating local building codes and state statutes governing rental properties.

Community Health & Wellness: Health Screenings

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View this YouTube Video online

In this short video, FIRST 5 Santa Clara County discusses health screenings using evidence-based, standardized screening tools to identify health needs for follow-up assessments. These screenings are completed in elementary schools, preschool programs, and public health clinics, as good health is linked to readiness to learn, fostering better educational opportunities for children.

Watch the video, and then respond to the following questions.

1. How are health and education related?
2. What are some of the barriers to obtaining health care described in the video?
3. What is meant by the term *high touch, high tech*, and how is it related to the role of the nurse?

Environmental Conditions

The most common environmental conditions that may negatively impact population health are air quality, water safety, and extreme weather. Indoor and outdoor air quality is a major contributor to health.

Air Quality

Globally, air pollution is estimated to be responsible for nine million deaths per year, equating to one in six deaths worldwide (Fuller et al., 2022). The USDHHS reports that air pollution is associated with 100 to 200 thousand annual deaths in the United States (ODPHP, 2020p). Air quality is affected by pollution from smoke, dust, carbon monoxide, ozone, and nitrogen oxides. Indoor air quality can be affected by environmental smoke, cooking oils and smoke, secondhand smoke, and exposure to mold or radon. Outdoor air pollution can be affected by environmental smoke, car exhaust fumes, and other outdoor air pollutants. Pollution occurs with motor vehicles and industrial plant emissions and fires (Figure 8.4). Poor air quality can cause or exacerbate respiratory illness, and air pollution has been linked to lung cancer and heart disease. Urban communities tend to have more sources contributing to pollution and therefore tend to have worse air quality than more rural areas (ODPHP, 2020p). BIPOC communities disproportionately encounter more air pollution than predominantly White communities due to a history of structural racism. BIPOC neighborhoods are more likely to be located near factories and other industrial facilities that emit more pollution due to discriminatory city planning (ODPHP, 2020p). See Structural Racism and Systemic Inequities for more information.

Exposure to loud noises and living in close proximity to hazardous waste sites are other environmental community factors that adversely impact health. Traffic and construction contribute to noise pollution, which is associated with hearing loss and has been found to elicit stress responses in the body. BIPOC communities and low-income communities are disproportionately impacted

by noise pollution. Living near hazardous waste sites or industrial facilities is also associated with increased rates of cancer, respiratory disease, skin conditions, and adverse pregnancy outcomes compared to those not living near these sites (Taylor, 2022).



Figure 8.4 Poor air quality affects the residents living in this area. (credit: "Wildland Urban Interface at Sherburne National Wildlife Refuge" by Russ Langford/USFWS/Flickr, Public Domain)

Water Quality

Access to safe, regulated water for drinking, bathing, and cleaning is an important determinant of health. While the U.S. water supply is generally considered safe, it can be contaminated with pathogens or chemicals that can cause illness and disease (ODPHP, 2020e). Each year, an estimated 7.2 million individuals in the United States become ill from waterborne diseases such as cryptosporidiosis, giardiasis, pseudomonas, and vibriosis (CDC, 2020b). See Epidemiology for Informing Population/Community Health Decisions. The Safe Drinking Water Act (SDWA) allows the Environmental Protection Agency (EPA) to set and enforce standards for drinking water quality (CDC, 2022e). Despite these regulations, water quality can still be affected by the natural and built environment and by sociopolitical factors. Studies have found a higher risk of exposure to water contaminants, like nitrates, and arsenic, and to poor water quality in BIPOC communities and communities with lower incomes (ODPHP, 2020p). In addition, the SDWA does not regulate private wells, placing some individuals and families at increased risk for water-related issues if their wells are not properly maintained, particularly those living in rural areas without municipal water sources. Well water also has higher levels of nitrates than water from municipal water systems (ODPHP, 2020p). Arsenic is associated with nausea, vomiting, anemia, abnormal heart rhythms, and paresthesias, and nitrates decrease the blood's ability to carry oxygen to the tissues and can cause hypotension, tachycardia, headaches, gastrointestinal upset, and vomiting (CDC, 2022d).

The Roots of Health Inequities: Water Quality

Access to safe drinking water is a social determinant of health. Consuming contaminated water has serious negative health consequences, such as is being seen in Flint, Michigan, where children are still experiencing the consequences of lead toxicity caused by unsafe drinking water. The problem began in April 2014, when, for economic reasons, the city changed the source of its water supply from Lake Huron to the Flint River without first taking necessary corrosion control measures. This switch caused water distribution pipes to corrode, ultimately causing dangerously high levels of lead to leach into the drinking water supply. Soon after the change, residents started complaining about the water quality, noting discoloration, smell, and taste, but they were largely ignored.

Pediatrician Dr. Mona Hanna-Attisha was concerned with the number of elevated lead levels she was seeing in her clinic. She compared the blood lead levels of 1,700 Flint children prior to the water switch with their levels after the switch and found that in areas where the water lead levels were highest, there was the greatest increase in children's blood lead levels. In 2015,

Dr. Hanna-Attisha sounded the alarm about her findings and held a press conference. Two weeks later, Michigan governor Rick Snyder ordered the water to be switched back to Lake Huron (Alfonsi, 2020). However, the corroded pipes continued to release lead into the drinking water. The governor declared a state of emergency in January 2016 (Ruckart et al., 2019).

Lead poisoning is a preventable environmental health threat to children, who are most susceptible to the adverse effects of lead exposure. There is no safe level of lead; it is an irreversible neurotoxin and impacts cognition and behavior, resulting in potential developmental delays and lowered IQ levels. Lead toxicity can affect every body system, causing neurological, renal, hematological, endocrine, gastrointestinal, cardiovascular, reproductive, and developmental effects. Lead also crosses the placenta, placing pregnant clients exposed to lead in danger of exposing their developing fetus. Low levels of lead in developing babies have been found to affect cognitive development and behavior (CDC, 2020a; Ruckart et al., 2019). Following the Flint water crisis, an estimated 14,000 children under the age of six may have been exposed to lead in their water. “Three years after the crisis began, the percentage of third graders in Flint who passed Michigan’s standardized literacy test dropped from 41% to 10%” (Alfonsi, 2020, para. 32).

Flint is a city with a majority BIPOC population, and 40 percent of the population lives in poverty (Kennedy, 2016). Do you think complaints of discolored and foul-smelling water would have been ignored for 18 months if the demographic profile of the Flint population were different? What is the role of a community health nurse in addressing this public health issue? What interventions could the community health nurse implement to assist families affected by this crisis?

Extreme Weather

Severe weather events such as heat waves, tornadoes, and floods may cause direct injury and death or infrastructure damage that leads to negative health effects. Individuals who experience severe weather may undergo declines in mental health and worsening chronic medical conditions. Often, during severe weather events, the health care system is unable to function normally, creating a backlog of clients in addition to the increased number of individuals who require medical care from direct effects of the weather.

Severe weather events correlate with climate change, a long-term change in weather patterns that describes how rising temperatures and changes in amounts of rainfall impact the planet, with rising sea levels, shrinking glaciers, and associated changes in the blossoms of flowers and plants (Denchak & Turrentine, 2021). More than an environmental issue, severe weather due to climate change is a “fundamental threat to human health and well-being” (Levy et al., 2018, p. 1). The effects of climate change, with increasing numbers of severe weather events and shifts in weather patterns, are expected to continue. Variable weather can include unusually harsh conditions in areas that are not used to and are therefore not prepared to deal with them. Individuals and families in affected regions may experience new or exacerbated financial hardships as they manage living with extreme heat, drought, floods, or snowfall.

In areas unaccustomed to warm weather, the warming climate increases the risk of vector-borne diseases and waterborne pathogens. Warmer temperatures increase the geographic distribution of where vectors, such as mosquitoes and ticks, can survive, breed, and spread disease. Increasing rainfall, often secondary to warming temperatures, can produce standing water, creating more breeding grounds for mosquitoes. Warmer temperatures also increase the likelihood of waterborne diseases, as warmer temperatures facilitate pathogen survival, and heavy rainfall further mobilizes pathogens and compromises water and sanitation systems (Levy et al., 2018). Extreme heat is associated with respiratory and heat-related illnesses. These heat-related ailments are especially prevalent in urban areas, where the concrete footprint traps and intensifies heat, creating what is referred to as an urban heat island, a city or metropolitan area with a higher temperature than the rural areas around it.

Weather changes disproportionately affect BIPOC communities and those with low incomes due to issues around location, access to resources, and quality of infrastructure. Additionally, individuals who are Hispanic or Latina/Latino are more likely to work construction and agriculture jobs that expose them to more severe weather (ODPHP, 2020p). A study found that in 169 of the 175 largest U.S. urban areas, BIPOC individuals were more likely than White individuals to live in urban heat islands. The temperature difference between an urban heat island and an outlying area can be as high as 20 degrees Fahrenheit (Ndugga & Artiga, 2021). See Environmental Health for more information.

How the Environment Affects Our Health

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View this YouTube Video online

This short CDC video discusses the intersection of the environment and the social determinants of health, highlighting the importance of environmental health.

Watch the video, and then respond to the following questions.

1. What are some examples of how the environment can negatively affect health?
2. How might a nurse use tools like the CDC's Environmental Public Health Tracking Network described in the video when caring for clients in their community?

The Role of the Nurse in Addressing Environmental Conditions

Community and public health nurses work within the core functions of assessment and policy development to monitor environmental conditions and their effects on health outcomes. They assess and monitor population health, investigating and addressing health hazards and their root causes. In areas with high levels of air pollution, these nurses monitor the community's respiratory health, as poor air quality can cause or exacerbate respiratory health conditions. For any increased prevalence of air pollution-related respiratory issues, these nurses educate the public and mobilize community partnerships to address the issue. By cataloging the detrimental health effects of air pollution, public health nurses have evidence to support the implementation of new laws and policies to address its causes. For residents struggling with poor indoor air quality, educating individuals and families on the importance and use of indoor air filters is a great mitigating and possibly a primary prevention intervention.

Community health nurses assess poor health outcomes related to contaminated water and investigate or address these health outcomes. While the EPA sets standards for water quality within public municipal water systems, compliance is often left to local governments. Once a link between water quality and health outcomes is established, community and public health nurses communicate with and educate the local government and the public, and they mobilize efforts to address the root cause. Using legal and regulatory avenues, the public health nurse assures that the community can access one of the most basic human rights, safe water. See Pandemics and Infectious Disease Outbreaks for more information on waterborne disease.

Community and public health nurses should familiarize themselves with environmental health concerns and join environmental nursing groups such as the Alliance of Nurses for Healthy Environments (ANHE) to stay current on the latest climate change information. A national nursing organization focused on the intersection of health and the environment, ANHE offers many learning opportunities, with podcasts, webinars, newsletters, and other events. Its goal is to advance research, incorporate evidence-based practice on the environment, and influence policy (ANHE, n.d.). Massachusetts General Hospital Institute of Health Professions (MGH IHP) has opened a Center for Climate Change, Climate Justice, and Health, created and driven by nurse scholars passionate about tackling climate change issues. This center offers many opportunities for health professionals to learn about the issues and to "address mitigation, adaptation, and resilience through education, practice, research, and service related to the health effects of climate change" (MGH IHP, 2023, para. 1).

Nurses can use information from these resources to implement community interventions and to advocate for policy changes to address climate change. Some community interventions require community health nurses to collaborate with local government, city planners, and urban designers to investigate ways to mitigate the effects of climate change, such as promoting the planting of more trees and greeneries, on the street and on rooftops, to relieve heat and improve air quality. At the family level, the community health nurse can direct families struggling with heating or electricity costs to resources such as low-income home energy assistance programs.

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3.14.4: Educational Environment, Access, and Quality

Learning Objectives

By the end of this section, you should be able to:

- Describe the association between health indicators and educational level.
- Explain the implications of poverty, disabilities, and discrimination on learning and access to quality education.
- Discuss the intersection between the social determinants of health and health literacy.

The evidence is clear: individuals with higher levels of educational attainment are more likely to live longer and healthier lives (ODPHP, 2020c). Higher levels of educational attainment refer to the education a person completes after receiving a high school diploma, such as earning an associate or baccalaureate degree. Education is one of the most important modifiable SDOH, as higher education is associated with increased healthy lifestyle behaviors and improved health outcomes. Those with higher educational attainment have greater economic resources and better access to health care (RHIhub, 2020a).

In contrast, a person is said to have low educational attainment if they have not completed high school. This is associated with economic insecurity and can result in overall worse health outcomes. The cycle of poverty and economic insecurity affects both educational access and the quality of education. Individuals in impoverished neighborhoods often have less access to community resources and wield less effective political influence, rendering them less able to demand higher-quality schools. Lower-quality schools lack the resources to support students, resulting in significant educational opportunity gaps based on neighborhood and school district. For example, children from low-income families are more likely to struggle with math and reading. They are less likely to graduate from high school and go to college than children from higher-income families (ODPHP, 2020c). Academically gifted children attending public schools in low-income areas are also less likely to have access to gifted and talented programs if their schools do not offer these resources or if their families cannot afford to access them elsewhere (Yaluma & Tyner, 2021). The stress of living in poverty can adversely affect a child's brain development, making it harder for them to do well in school (ODPHP, 2020c). This can have a domino effect, as a college education is associated with safer and higher-paying jobs; individuals who do not graduate from high school or go to college are more likely to have chronic health problems (ODPHP, 2020c).

The Roots of Health Inequities: The Educational Roots of Health Inequities

The educational roots of health inequities result from institutional and systemic biases in policies that separate individuals into either resource-rich or resource-poor neighborhoods, as these neighborhoods dictate school access. This separation into resource-rich or resource-poor neighborhoods is principally based on socioeconomic position and race, resulting in wide health disparities in life expectancy and health outcomes, as education is a major factor in shaping the course of an individual's life.

(See Weinstein et al., 2017.)

Early Childhood Development and Education

A child's first 5 years of life are critical for cognitive, emotional, and physical growth and development. A healthy, safe, and stable early childhood helps determine if a child will have a healthy, happy life. A variety of social, environmental, and economic factors greatly affect early childhood development. Risk factors for potential developmental delays and future poor health outcomes include early life stressors, low income, and lack of access to quality early educational programs. In contrast, protective factors include higher socioeconomic status (SES), stable relationships with caregivers, and access to quality early education programs (ODPHP, 2020m).

As mentioned previously, early life stressors and ACEs impact a child's health. Early life stressors such as physical abuse, family instability, poverty, and unsafe environments contribute to developmental delays and poor health outcomes later in life. These children may lack adequate coping skills and have difficulty regulating their emotions and behaviors, thereby struggling in early childhood education programs (ODPHP, 2020m). Inadequate social functioning skills like lack of impulse control, difficulty

forming relationships, and trouble regulating behaviors can negatively impact a child's ability to learn or connect with peers in early elementary school programs.

Poverty, by itself, negatively impacts children's academic achievement. Research has demonstrated that children from disadvantaged backgrounds are more likely than other children to repeat grades and drop out of high school (ODPHP, 2020m). Children from communities with higher SES and more resources have been shown to experience safer and more supportive environments and better early education programs. Quality early childhood programs help foster the mental and physical development of children. They are linked to increased earning potential and higher educational attainment (ODPHP, 2020m).

Early childhood education programs can help reduce educational gaps. Head Start is a federally funded early childhood program that supports children from low-income families. It provides comprehensive services and strives to improve health, increase learning and social skills, and prepare young children for kindergarten. Studies have demonstrated that children who experience quality early education programs like Head Start that are comprehensive and include health care and nutritional components partake in less risky health behaviors such as binge drinking alcohol, smoking cigarettes, and using illegal substances and have lower risks for heart disease, obesity, hypertension, hyperglycemia, and hypercholesterolemia (ODPHP, 2020m). Quality comprehensive early childhood development and education programs reduce risky heath behaviors and prevent or delay the onset of chronic disease in adulthood.

The quality of education in elementary schools is an important determinant in the health and well-being of children. Receiving a high-quality elementary school education reduces educational disparities in children. Children attending a school with safety concerns, limited health resources, and low teacher support are more likely to experience adverse physical and mental health. Until disparities in access to quality early childhood development programs and quality school systems are addressed, children without access will suffer worse health outcomes (ODPHP, 2020m).

Theory in Action: Brain Architecture in Early Childhood

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View this YouTube Video online

In this University of Minnesota Center for Early Education and Development video, Dr. Megan Gunnar discusses the impact of early childhood development on the future abilities and health outcomes of children.

Watch the video, and then respond to the following questions.

1. How does early childhood development affect learning later in life?
2. List five ways families and communities can help build a strong and proper brain foundation in early childhood.
3. How does a strong brain foundation impact health outcomes?

High School Graduation

Most jobs require at least a high school (secondary) education. Individuals who do not complete high school have limited employment opportunities, earn lower wages, and are more likely to live in poverty. Disparities in high school completion rates exist by racial and ethnic groups with Black and American Indian/Alaska Native students having the lowest graduation rates (ODPHP, 2020o). Students' home and school environments impact their chances of graduating from high school. High school graduation can be affected by family support, the school district, resources within the school, and the greater community.

Lack of parental involvement in school is linked to lower graduation rates. Teacher quality is also a critical factor; students who believe their teachers are of high quality and that they care are more likely to graduate, whereas students who feel their teachers are uninterested in teaching are more likely to drop out (ODPHP, 2020o). Violence and safety concerns also affect high school dropout rates. Low-income families often live in neighborhoods where schools lack resources and underperform. These factors contribute to higher dropout rates and lower academic achievement. In 2016, low-income families were almost four times more likely than high-income families to have a student not complete high school (ODPHP, 2020o). Economically insecure BIPOC

communities are disproportionately represented with lower educational attainment in comparison to economically insecure White individuals. Approximately 85 percent of economically insecure White adults have at least a high school diploma, whereas only about 50 percent of economically insecure adults who identify as Latina/Latino have attained their diploma (Langston, 2018).

Reading skill level in third grade is linked to high school completion rates. One Annie E. Casey Foundation study found that almost a quarter of students with below-basic reading skill level in the third grade failed to finish high school compared with 4 percent of students with third-grade proficient reading skills who failed to finish high school (ODPHP, 2020o). Twenty-six percent of students who were not reading at the proficient level in third grade and who had lived in poverty for at least one year during their school years did not finish high school on time or at all (ODPHP, 2020o). Teen pregnancy and parenthood are also risk factors for dropping out of high school, as only half of teens who have given birth earn a high school diploma.

Many positive outcomes come with graduating from high school. Individuals with a high school diploma have a decreased risk of premature death, more employment opportunities, and a higher lifetime earning potential (ODPHP, 2020o). Lacking a high school diploma is associated with self-reported overall poor health and chronic health issues such as asthma, diabetes, heart disease, hypertension, and hepatitis. Additionally, individuals with a high school diploma who are employed full-time earn almost 25 percent more than those who are employed full-time without a high school diploma (ODPHP, 2020o). Supporting individuals to graduate high school is an important public health intervention.

Enrollment in Higher Education

Higher education refers to any education after high school, including community colleges, vocational and technical schools, colleges, and universities. Many higher-paying jobs require a college degree; less than one in five economically insecure individuals have a college degree, whereas half of economically secure individuals do (Langston, 2018). College graduates have more employment options than individuals without college degrees. On average, lifetime earnings for individuals with a bachelor's degree are double those of individuals without a degree (ODPHP, 2020n). Higher education is associated with better-paying, less hazardous jobs. This all supports an individual's health, as the higher their income, the greater their ability to secure material and social resources like higher-quality housing and social status (ODPHP, 2020n). Overall, higher education is associated with improved health and a decreased risk of premature death. Individuals with more education are more likely to partake in healthy behaviors, such as drinking less alcohol, exercising regularly, and seeking preventive health care when needed (ODPHP, 2020n).

How well an individual's middle and high schools prepare them for college greatly influences their likelihood of graduating. Students who attend high schools that do not provide honors or advanced courses may be less academically prepared for college-level work than students who attend high schools that provide these courses (ODPHP, 2020n). Students without access to a consistent guidance counselor may not receive help navigating the college application and admissions process. In many low-income neighborhoods, schools lack the financial resources necessary to offer these courses and dedicated guidance counselors, potentially lowering college admissions rates for their students (ODPHP, 2020n).

While the diversity of undergraduate college students is increasing, BIPOC individuals still demonstrate lower levels of academic persistence in college compared to their White counterparts (ODPHP, 2020n). Black and Hispanic individuals also have lower college enrollment and graduation rates. These lower enrollment and graduation rates may be affected by the discrimination, social isolation, and stress of debt accumulation that these students face (ODPHP, 2020n). BIPOC students experience discrimination at rates two to four times higher than White students, and in a study up to a quarter of these students reported feeling that the discrimination they experienced adversely affected their academic outcomes (Stevens et al., 2018). Barriers to higher education exist, but strengthening the curriculum in school districts in lower-income communities and offering more teacher and guidance counselor support can help to better prepare students for the admissions process and the rigors of college (ODPHP, 2020n).

The Role of the Nurse in Addressing Educational Disparities

Community and public health nurses play an important role in early childhood, primary, and secondary education. Partnering with school nurses and administrators, community and public health nurses can use their assessment data as a foundation to influence policy development at the local level. By analyzing trends in the data and presenting this information to the local school committee and city officials, nurses can advocate for meaningful change, such as creating or expanding Head Start programs to ensure equal access to evidence-based successful early childhood education programs. Community and public health nurses can also advocate for increased funding for school districts to create high-quality primary education. Community and public health nurses can advocate for and support transition programs to support students moving from middle to high school. Additionally, nurses can advocate for advanced courses and other programs that better prepare students for the future. These types of programs can

encourage students to continue with their studies.

Education Gap: The Root of Inequality

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In this video, Harvard University's Director of the Achievement Gap Initiative, Ronald Ferguson, discusses educational inequality and encouraging efforts that are being made in Boston to address these gaps. This is an example of a community-level approach to addressing educational inequalities that a community and population health nurse can spearhead and lead.

Watch the video, and then respond to the following questions.

1. Why do you think educational gaps exist?
2. How do you think the Boston Basics program can help address these educational gaps?
3. What is the community health nurse's role in addressing and responding to these educational gaps?

Language and Literacy

Literacy refers to listening and speaking skills, reading and writing skills, and cultural and conceptual knowledge. Health literacy refers to an individual's ability to find, understand, and use health-related information (ODPHP, 2020t). Low literacy skills are linked with lower educational attainment, poorer health outcomes, and chronic diseases like diabetes and cancer (ODPHP, 2020l).

Limited English proficiency (LEP) can be a barrier to accessing health care services. Individuals with limited English proficiency tend to be immigrants to the United States who may speak another language at home. In 2019, almost 22 percent of the U.S. population ages five and above spoke a language other than English at home, and among these individuals, 39 percent reported speaking English less than very well (ODPHP, 2020l). Individuals who identify as having limited English proficiency are less likely to have a primary care provider and, therefore, less likely to have preventive health care (ODPHP, 2020l). These individuals also encounter difficulty following medication instructions and communicating with health care providers.

Many barriers impede individuals with limited English proficiency from receiving appropriate health services. A lack of trained interpreters and culturally responsive health care providers adversely affects their health. Cultural barriers, language barriers, and financial difficulties create significant obstacles for immigrants trying to access health information (ODPHP, 2020l). Language barriers create a quality-of-care issue, especially if the provider is not linguistically competent, and a lack of quality trained interpreters impedes access to mental health services for individuals with limited English proficiency (ODPHP, 2020l). See Culturally and Linguistically Responsive Nursing Care for more information on this topic.

Case Reflection: Client Education

Read the scenario, and then respond to the questions that follow.

Serena and her children attend the local community center's biannual fair. Twice a year, the community center hosts this one-day event for the community's residents, where they have food, games, health screenings, health promotion education events, yoga, senior center representatives, and sign-up sheets for various community groups. Serena decides to have her blood pressure (BP) taken at the screening tent. Her BP reading is 162/92. The nurse takes it manually and repeats it two times, but the readings are similar. The nurse asks Serena about any medical history of daily medications, but Serena shakes her head no. She feels lucky to be healthy overall and does not take any medications except for ibuprofen for headaches occasionally.

1. What factors could be contributing to Serena's elevated blood pressure?

2. What lifestyle questions could the nurse ask Serena to develop a health teaching plan for her?

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3.14.5: Social and Community Context

Learning Objectives

By the end of this section, you should be able to:

- Describe the impact of civic participation on individual health.
- Define discrimination and discuss its impact on the social determinants of health.
- Explain how incarceration is linked to the other social determinants of health.
- Discuss the importance of social capital and cohesion in relation to health outcomes.

The social and community context determinant of health includes civic participation, discrimination, incarceration, and social cohesion. Because relationships with family, friends, colleagues, and neighbors greatly impact health and well-being, Healthy People 2030 focuses on increasing social and community support (ODPHP, 2020f). Positive relationships help buffer the negative effects of unsafe neighborhoods, discrimination, and poverty and, by extension, improve overall health and well-being (ODPHP, 2020f).

Civic Participation

Civic participation refers to a range of activities that benefit the community and provide health benefits for participants (APA, 2023). Civic participation helps build social capital, the value gained from having positive interactions and connections between people that enables the community to function effectively and collaboratively in problem-solving efforts. It is these relationships and networks that support the neighborhood and community. By building social capital via civic engagement, members of civic groups are more likely to be physically active and to engage in meaningful activities, providing a sense of purpose (ODPHP, 2020g). Examples include volunteering at community parks, nature reserves, senior centers, community centers, and adult day centers. It can also include civic engagement in the form of environmentalism, education, recycling efforts, composting, farming, and community gardening. Overall, volunteers experience increased psychological well-being and emotional health (ODPHP, 2020g), and adult volunteers aged 60 and above have a lower risk of cognitive impairment (Infurna et al., 2016). Community gardening is associated with increased neighborhood pride, motivation to be involved, and access to healthy foods (Figure 8.5) (ODPHP, 2020g). Group membership has also been found to increase social capital and benefit members by increasing opportunities for social gatherings. Groups such as the Lions Club, Girl Scouts, and Rotary International clubs can be formal, and there can be informal groups, such as book clubs and walking groups (ODPHP, 2020g). Ultimately, individuals and families who are active in their community and have connections with other individuals in their community are happier and healthier.



Figure 8.5 Volunteering at a community garden allows residents to socialize and access fresh produce. (credit: “Community Garden” by Kevin Krejci/Flickr, CC BY 2.0)

Discrimination

As discussed in Structural Racism and Systemic Inequities, discrimination refers to unfair treatment of individuals and groups based on certain characteristics such as race, ethnicity, gender, age, religion, sexual orientation, and ability (ODPHP, 2020h). It assigns value based on the social interpretation of how one looks or acts, and it manifests in social actions aimed at protecting more privileged groups at the expense of less privileged ones (ODPHP, 2020h). Discrimination is prevalent in the United States, where 63 percent of adults report experiencing discrimination every day, impacting a variety of population groups, such as older adults, certain ethnic and racial groups, individuals identifying as lesbian, gay, bisexual, transgender, and queer/questioning, (LGBTQ), and individuals experiencing disabilities (ODPHP, 2020h). Discrimination is a public health threat. It can precede stress-related emotional, physical, and behavioral changes, resulting in adverse health outcomes across the age spectrum (APA, 2022). These adverse health outcomes include tachycardia, anxiety, hypertension, and gastrointestinal ulcers that lead to negative long-term health outcomes over time. Caring for Vulnerable Populations and Communities discusses the effects of discrimination on health outcomes in more detail.

Discrimination occurs at both the individual and structural levels. Structural discrimination refers to institutional policies, systems, laws, and practices that limit individuals’ and populations’ opportunities, resources, and power based on race, ethnicity, gender, ability, SES, and religion. These deeply rooted practices and beliefs propagate pervasive unjust treatment and oppression of individuals (Braveman et al., 2022).

Discrimination based on race has been linked to significant disparities in health outcomes, attributed to the cumulative effects of racism on the body. Structural racism in health care often results in Black clients receiving poorer-quality care. The 2019 National Healthcare Disparities Report found that White clients receive a better quality of care than almost 41 percent of Black clients (Taylor et al., 2019). In 2018, non-Hispanic Black infants in the United States had 2.4 times the infant mortality rate of White infants (USDHHS Office of Minority Health, 2021). This disparity is rooted in racism; structural racism has resulted in Black women receiving poorer-quality care. On an individual level, the stress from enduring discrimination and racism is cumulative and triggers biological processes that places these women at higher risk for pregnancy-related complications such as preeclampsia, eclampsia, embolisms, and mental health related issues (Taylor et al., 2019). Structural Racism and Systemic Inequities discusses race-based structural discrimination in more detail.

Theory in Action: What Is Intersectionality?

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This animation defines *intersectionality* and explores the reasons why common approaches of addressing discrimination fall short in addressing all the negative factors that may hinder an individual's well-being.

Watch the video, and then respond to the following questions.

1. How would you explain intersectionality?
2. How can the nurse apply the concept of intersectionality in community health nursing?
3. Can you think of any client encounters from clinical or work experiences where you witnessed the intersection of multiple forms of discrimination at one time? How did this make you feel?

Incarceration

Incarceration refers to confinement in a prison or a jail. Incarceration affects the health of those incarcerated and their families and communities. BIPOC communities and individuals with lower levels of education are disproportionately affected by higher incarceration rates due to the federal policies of the 1960s and 1970s resulting in increased police surveillance and mass incarceration. As of 2018, Black Americans were incarcerated at more than five times the rate of White Americans (Gramlich, 2020). That year, Black Americans represented approximately 12 percent of the U.S. adult population, yet they represented 33 percent of the incarcerated population, while White Americans represented 63 percent of the U.S. adult population and comprised 30 percent of the incarcerated population (Gramlich, 2020). During this same time period, Hispanic Americans represented 16 percent of the U.S. adult population but accounted for 23 percent of the incarcerated population (Gramlich, 2020). Data indicates that White men without a high school diploma or General Education Development (GED) equivalent have a significantly higher risk of being incarcerated (1 in 8) when compared to their more educated peers (1 in 57) (ODPHP, 2020i). Communities with higher rates of poverty and unemployment are disproportionately burdened by higher incarceration and recidivism (being arrested or incarcerated again) rates (ODPHP, 2020i). Structural Racism and Systemic Inequities and Caring Across Practice Settings discuss issues related to incarceration in more detail.

Individuals with a history of incarceration have been found to have worse physical and mental health compared to the general population. Women in this demographic are more likely to have experienced ACEs than women not in the criminal justice system, illustrating how early childhood experiences place certain individuals at higher risk for adverse life outcomes (ODPHP, 2020i). Individuals who have experienced incarceration have higher rates of mental health disorders, hypertension, asthma, cancer, arthritis, tuberculosis, hepatitis C, and HIV (ODPHP, 2020i). This heavy disease burden has implications for when these individuals reenter the community. Already at a financial disadvantage, they may have trouble finding employment and a place to live given their criminal record and lack the resources to seek the medical care needed to manage their conditions. This reinforces the cycle of poverty and poor health outcomes. The United States releases millions of individuals from jail and prison each year, yet recidivism is fairly common, as more than 50 percent of individuals are incarcerated again within 3 years of their initial release. This may be due to the obstacles these individuals face when reentering society (ODPHP, 2020i).

Incarceration often negatively impacts the families of those individuals who are incarcerated. Almost half of incarcerated individuals have minor children, about 19 percent of whom are age 4 or younger (Wang, 2022). Having a parent incarcerated is considered an ACE because it places these children at higher risk for cognitive and health-related challenges throughout their lives and because they are more likely to live in poverty and be homeless (ODPHP, 2022i). These children have higher rates of developmental delays, learning difficulties, speech and language issues, attention disorders, and aggressive behaviors, and they are up to five times more likely to be involved with the criminal justice system than children without incarcerated parents (ODPHP, 2020i). Illustrating the generational effects of parental incarceration as an ACE, many incarcerated parents also grew up in challenging situations:

- 17 percent spent time in foster care.
- 43 percent are from families that received public assistance.
- 19 percent lived in public housing before the age of 18.
- 11 percent were homeless at one point before the age of 18.
- 32 percent had or currently have an incarcerated parent (Wang, 2022).

Community and public health nurses have a role in identifying children who are at risk due to parental incarceration. After identification, nurses can begin a targeted approach to secure access to resources and educational programs aimed at supporting these children and their caregivers. This involves an interprofessional team of school nurses, guidance counselors, and therapists and early childhood educational programs for those that qualify. Community and public health nurses can collaborate with the justice system to advocate for programs such as drug treatment courts to help keep individuals out of prison while treating their addiction (ODPHP, 2020i). Correctional nurses can provide and advocate for comprehensive health services during incarceration to address the individual's holistic needs (ODPHP, 2020i; see Caring Across Practice Settings). Community nurses can help individuals who reenter the community access health care, employment resources, food, and housing.

Social Cohesion

Social cohesion refers to the strengths of relationships within a community (ODPHP, 2020j). An indicator of social cohesion is the amount of social capital within a community. Places of worship, community centers, libraries, and families are common sources of social capital. Collective efficacy is another aspect of social cohesion and is based on trust. It refers to a community's ability to create change and influence behavior through social norms (ODPHP, 2020j). This is associated with improved self-rated health, lower rates of neighborhood violence, and improved access to medical care, healthy food, and places to exercise (Matsaganis & Wilkin, 2015).

Research has demonstrated that high levels of social support positively influence health outcomes such as healthier eating habits, exercise, and even dealing with stress (ODPHP, 2020j). For example, social support contributes to lower atherosclerosis levels (Shah et al., 2021) and is a protective barrier to the harmful consequences of discrimination for many first-generation immigrants (Szaflarski & Bauldry, 2019). Many studies have linked social isolation to detrimental health effects and increased overall mortality, especially in older adults (ODPHP, 2020j). The CDC considers loneliness and social isolation in older adults a significant public health threat, with almost one quarter of adults ages 65 and older considered socially isolated (CDC, 2019). Social isolation also disproportionately affects vulnerable populations, including immigrants and lesbian, gay, bisexual, and transgender (LGBT) populations (CDC, 2019). Social isolation and loneliness are associated with the following health outcomes (CDC, 2019):

- 50 percent increased risk of dementia
- 29 percent increased risk of heart disease
- 32 percent increased risk of stroke
- Higher rates of depression, anxiety, and suicide

Social networks are foundational to a healthy and thriving community. They create social cohesion, can spread positive health behaviors, and give a sense of community to individuals and families (ODPHP, 2020j). Community and public health nurses are well positioned to foster the development of social networks, especially in vulnerable populations. Through senior centers, councils on aging, ethnic centers, local Boys and Girls Clubs, local Y clubs (formerly known as the YMCA), libraries, local government offices, and assisted living facilities, community health nurses can nurture the development of community groups and events (Figure 8.6). By helping to develop programming to refer at-risk individuals and families to existing programs, nurses can make an impact.



Figure 8.6 A community center provides a location for children and families to gather and build social capital. (credit: “Community Center” by Billy Brown/Flickr, CC BY 2.0)

Theory in Action: County Health Rankings Model

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The University of Wisconsin Population Health Institute, with the Robert Wood Johnson Foundation’s support, has conceptualized a population health model illustrating a broad vision for health, demonstrating how policies and programs shape a community’s health and outcomes, both quantity and quality of life. This video highlights this model, showing all the factors that impact health (the SDOH) and demonstrating that upstream interventions can be implemented at the population health level to ensure that each individual and community thrives.

Watch the video, and then respond to the following questions.

1. What are your impressions of this model?
2. Do you feel the model is an accurate representation of the intersection of health and social, economic, and environmental factors? Why or why not?
3. How might one use this model in population health nursing?

Explore the model.

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3.14.6: The Cumulative Effect of Inequalities on Health

Learning Objectives

By the end of this section, you should be able to:

- Define *health equity* and *health inequity*.
- Describe health disparities in the context of SDOH.
- Describe the cumulative impact of inequalities on individual and population health.

Social determinants of health contribute to preventable health disparities, and these disparities may result in health inequities, "differences in health status or health resources between different population groups, arising from the social conditions" (WHO, 2018, para. 2). Health inequities are more than just a lack of equal access to necessary resources; they are a result of an unjust system.

Equality refers to situations where each individual is given the same resources or opportunities. Equity recognizes that everyone is not the same and distributes the exact resources or opportunities needed by each individual to reach an equal outcome among individuals (Milken Institute School of Public Health [MISPH], 2020). The World Health Organization defines *equity* as the "absence of unfair, avoidable or remediable differences among groups of people, whether those groups are defined socially, economically, demographically, geographically or by sex, gender, ethnicity, disability, or sexual orientation" (WHO, 2021, p. 2). Equity is needed to address the historical injustices that have perpetuated structural racism and discrimination. It is a means to address the imbalance and injustice in our social systems. *Social justice* refers to overhauling social systems with the goal of sustainable, equitable access into the future (MISPH, 2020).

To achieve health equity, rather than treating everyone in the same way, individuals and communities need to be given resources and opportunities that align with their circumstances (MISPH, 2020). According to the CDC, achieving health equity requires an enduring effort to address historical and contemporary injustices to surmount obstacles to health care and eliminate health disparities (CDC, 2022g). To reduce health disparities, individual needs should be addressed holistically.

The SDOH have a greater influence on health outcomes than clinical care. Clinical care impacts only 20 percent of health outcomes, whereas socioeconomic factors account for 47 percent of health outcomes, and health behaviors account for 34 percent of overall health outcomes (Whitman et al., 2022). Social determinants have a much greater impact than biology or medicine. Within these social factors, there are many inequities. Addressing these differences in SDOH is a step toward health equity (CDC, 2022a). Racism and other SDOH are central drivers of health disparities and inequities within BIPOC communities, creating inequities in access to housing, education, wealth, and employment, thereby placing these individuals at higher risk for poor health (CDC, 2022a). The SDOH are at the root of many health inequities resulting from the unequal conditions in the social and physical environment. It is widely accepted that to influence the health of a population, there needs to be a focus on improving social conditions and addressing those SDOH (CDC, 2022a). Just as nurses assess for medication allergies and medical history, the SDOH need to become a part of every conversation as a foundation to holistically provide appropriate care and services to individuals and families in need.

Theory in Action: Screening for the Social Determinants of Health

The American Academy of Family Physicians has created a program called The EveryONE Project to assist health care professionals in advocating for health equity. As a part of this program, it has created a screening tool to assist health professionals in screening every client for the social determinants of health.

Visit its website to read the guide, and then respond to the following questions.

1. How did you feel as you read the team-based approach of The EveryONE Project?
2. Do you think that as a nurse, you will be able to effectively screen clients for the SDOH using this tool? Why or why not?
3. Do you think the health care community has an ethical duty to act and to do more to address the SDOH? Why or why not?

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3.14.7: Chapter Summary

Economically stable individuals and families have a steady source of income with consistent access to the resources that are essential for a healthy life, such as food, clothing, safe housing, transportation, quality child care, quality education, and health insurance. Almost 12 percent of the U.S. population lives in poverty and experiences economic insecurity. BIPOC communities comprise half of the individuals who are economically insecure, and the cycle of poverty often persists across generations. Poor health outcomes, including early cardiovascular disease, metabolic disease, diabetes, and mental health disorders, are directly linked to living in poverty, illustrating the concept of the socioeconomic gradient.

Neighborhoods and the built environment, including the quality and safety of water, air, and soil, the quality and safety of the community's infrastructure, housing, transportation, and roadways, and access to healthy foods that support positive eating patterns, directly impact health. Locations with limited options for affordable and healthy foods are considered food deserts. Neighborhood safety is a huge public health concern. ACEs are more likely to occur in lower-income communities; are linked to lifelong mental illness, chronic disease, and substance use; and negatively impact education and future earning power. Housing quality is an important determinant of health, as lead, mold, asbestos, vermin, and even crowded living conditions are all modifiable environmental risk factors associated with poor health outcomes.

Education is one of the most important modifiable SDOH; increased educational attainment is associated with an increase in healthy lifestyle behaviors and improved health outcomes. Individuals living in impoverished neighborhoods often have less access to community resources, such as high-quality schools, resulting in significant disparities in educational opportunities. Quality early childhood education programs can help reduce educational gaps, but access remains an issue. Fostering quality, accessible, and affordable early childhood education programs can positively impact educational attainment levels. Encouraging and assisting all students to achieve a high school diploma is associated with better employment opportunities and higher-paying jobs, resulting in overall improved health.

Positive community relationships and civic participation can help buffer the negative impact of unsafe neighborhoods, poverty, and discrimination. Social capital is associated with more physically active, happier, and healthier lives. Discrimination in any form is a public health threat. Structural discrimination is at the root of health disparities seen in BIPOC individuals. The SDOH are intricately tied to structural discrimination, racism, and persistent health disparities. High levels of social support positively influence health outcomes and decrease the incidence of social isolation and its negative impact on mental and physical health.

The SDOH have a greater influence on health outcomes than clinical care. Racism and other SDOH are central drivers of health disparities and inequities within BIPOC communities, creating inequities in access to housing, education, wealth, and employment, thereby placing these individuals at higher risk for poor health. Equity is needed to address the historical injustices that have perpetuated structural racism and discrimination. To influence the health of a population, it is necessary to focus on improving social conditions and addressing the SDOH. To reduce health disparities, individual needs must be addressed holistically. The Future of Nursing 2020-2030 report highlights health equity as a major focus for nursing, and this begins with assessing the SDOH with every client encounter.

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3.14.8: Key Terms

adverse childhood experience (ACE)
: a traumatic incident such as experiencing violence or abuse, witnessing violence at home or in the community, having a family member attempt suicide, or any event or environment that undermines a child's sense of safety, security, and bonding

built environment
: includes transportation access and roadways, the availability of green space, locations for community gathering, and the buildings or other physical structures within the neighborhood

civic participation
: a range of activities that individuals can participate in that benefit the community as well as participant health

collective efficacy
: a community's ability to create change and influence behavior through social norms

cost burdened
: describes households in which more than 30 percent of income is spent on housing

discrimination
: unfair treatment of individuals and groups based on characteristics such as race, gender, age, sexual orientation, and ability

economic insecurity
: a situation linked to poverty where an individual or family is unable to consistently afford housing, food, clothing, transportation, child care, or health care

economic stability
: a situation where the individual has a steady source of income and consistent access to resources essential for a healthy life

equality
: a situation where each individual is given the same resources or opportunities

equity
: the distribution of the resources or opportunities each individual needs to reach an equal outcome among individuals

food deserts
: areas where residents have limited or absent options for affordable and healthy foods

food insecurity
: a condition in which individuals or families have limited access to adequate amounts of food

generational poverty
: a persistent lack of a socially acceptable amount of money or possessions and disadvantage where children who grow up poor are more likely to be poor as adults

health disparities
: preventable differences in health between groups of individuals, usually resulting from social or economic factors, geographic location, and environment

health equity
: a state in which everyone has a fair and just opportunity to attain their highest level of health

health inequities
: differences in health status or health resources between population groups arising from social conditions

housing instability
: a situation where individuals and families have difficulty paying rent, live in overcrowded residences, move frequently, or spend a large part of their household income on housing

living wage
: payment for employment that affords a modest standard of living for the individual and family

poverty
: a state in which an individual lacks a socially acceptable amount of money or possessions

social capital
: value gained from having positive interactions and connections between people that enables the community to function effectively and collaboratively in problem-solving efforts

social cohesion
: the strengths of relationships within a community; an indicator is the amount of social capital, or shared group resources, within a community

social determinants of health (SDOH)
: the conditions in the environments where people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks

social justice
: the view that everyone deserves equal rights and opportunities; also refers to overhauling social systems with the goal of sustainable equitable access into the future

socioeconomic gradient
: the association between low socioeconomic position (SEP) and increased disease risk and premature death

socioeconomic position (SEP)
: one's position in society based on social and economic factors of income, education, and employment

structural discrimination
: deeply rooted institutional policies, systems, laws, and practices that limit opportunities, resources, and power of individuals and populations based on race, ethnicity, gender, ability, SES, and religion

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3.14.9: Review Questions

1.
Which of the following is a social determinant of health?

a. Where you live
b. Health behaviors
c. Genetic makeup
d. Age

2.
What is the main driver of economic stability?

a. Health
b. Food cost
c. Employment
d. Transportation access

3.
Which of the following neighborhood factors is considered an adverse childhood experience?

a. Absence of sidewalks to walk to school safely
b. Access to green spaces
c. Relying on readily accessible public transportation
d. Exposure to crime and violence

4.
What is the connection between education and health?

a. Attending a lower-quality school is associated with health literary
b. Higher education means higher socioeconomic position
c. Higher educational attainment is associated with higher health literacy rates
d. Health is not adversely impacted by the quality of education

5.
Which of the following activities is an example of building social capital?

a. Volunteering at the local community center
b. Attending parent-teacher conferences at the school
c. Composting in your own backyard
d. Utilizing the library to check out movies

6.
Which of the following scenarios is an example of health equity?

a. Providing mobile health screenings for individuals without transportation
b. Offering clinic appointments during standard business operating hours
c. Providing a health education session in English only
d. Offering all clients a fasting glucose screening at age 40

7.
Which of the following is an example of a health disparity?

a. BIPOC clients who are pregnant experience the highest rates of infant mortality
b. Heart disease and cancer are the two leading causes of death across race, gender, and ethnicity
c. Older adults have worse overall health outcomes compared with young adults
d. Professional tennis players tend to have a higher prevalence of elbow injuries

8.
How much does clinical care impact an individual's health outcomes?

a. 34 percent
b. 10 percent
c. 20 percent
d. 47 percent

9.
Why does the nurse assess the SDOH when caring for individuals and their families in the community?

a. The SDOH have a significant impact on the health, wellness, and quality of life of individuals and families
b. By assessing the SDOH, the nurse can standardize interventions based on where the individual and family reside
c. Because nursing is founded on the principle of social justice
d. The nurse wants to investigate the reasons why certain individuals and families have asthma

10.
The community health nurse is looking for a way to improve heart health. Within the framework of the SDOH and upstream thinking, what contributing factor to improving heart health would the nurse most likely focus on within the community?

a. Vaping
b. Low levels of physical activity
c. Lack of safe places to exercise
d. Unhealthy diet

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4: EPIDEMIOLOGY- THE STUDY OF DISEASE, INJURY AND DEATH IN THE COMMUNITY

This week we start our exploration of **epidemiology, the core science of public health**. We focus here on unpacking the types of numbers and studies that we use in public health to monitor the health of populations. I imagine that many of you have never taken a statistics course and this course certainly is NOT one. Yet, I hope that by understanding what *kind*s of numbers epidemiologists work with, you will be **better equipped to critically assess health information and to understand public health responses to epidemics.** We also look at how to find reliable health information on the internet or through a library.

4.1: Learning outcomes

4.2: Epidemiology and Public Health

4.3: What Does “Evidence-Based Practice” Mean?

4.4: Public Health Responses to Epidemics

4.5: Burden of Disease and Epidemiology

4.6: Public Health Statistics

4.7: Vital Statistics

4.8: Health Disparities and Inequalities

4.9: Cases and Rates

4.10: Morbidity and Mortality

4.11: Tracking the Spread of Covid-19

4.12: Reporting Births, Deaths, Diagnoses

4.13: Secondary Data

4.14: Epidemiological Studies

4.15: Types of Population Studies

- 4.15.1: Observational Studies
- 4.15.2: Experimental Studies

4.16: Causation

4.17: Etiology and Contributory Cause

4.18: Risk Factors and Protective Factors

4.19: Health Information

4.20: Public Health and the Fight Against Misinformation

- 4.20.1: Internet, Social Media, and the Age of Algorithms

4.21: Is Science Even Trustworthy?

4.22: The Value of Deeper Research

4.23: Documentary- Invisible Shield, episode 2

4.24: Additional Resources

4.25: References (additional references esp. for pages by Erin Calderone)

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4.1: Learning outcomes

After completing this module,students will be able to

1. Define the terms epidemic, endemic, pandemic, epidemiology, and epidemiologist.
2. Explain why rates are important in epidemiology and list some of the most commonly used rates (like the mortality rate).
3. Differentiate between incidence and prevalence rates, and give examples of each.
4. Define common terms used to describe the spread of a communicable disease like Covid-19.
5. Define life expectancy and years of potential life lost (YPLL), two common measurements of a population's health status.
6. Differentiate between a descriptive and analytical study.
7. Discuss several criteria for causation -- how scientists determine whether a particular exposure causes a disease.
8. Evaluate the reliability of health information using criteria such as currency, relevance, authority, accuracy and purpose (CRAAP test).
9. Conduct library research and cite sources appropriately, including being able to explain the importance of academic integrity.

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4.2: Epidemiology and Public Health

Public health aims to improve population health by identifying and addressing the causes of disease and injury, so they can be prevented wherever possible.

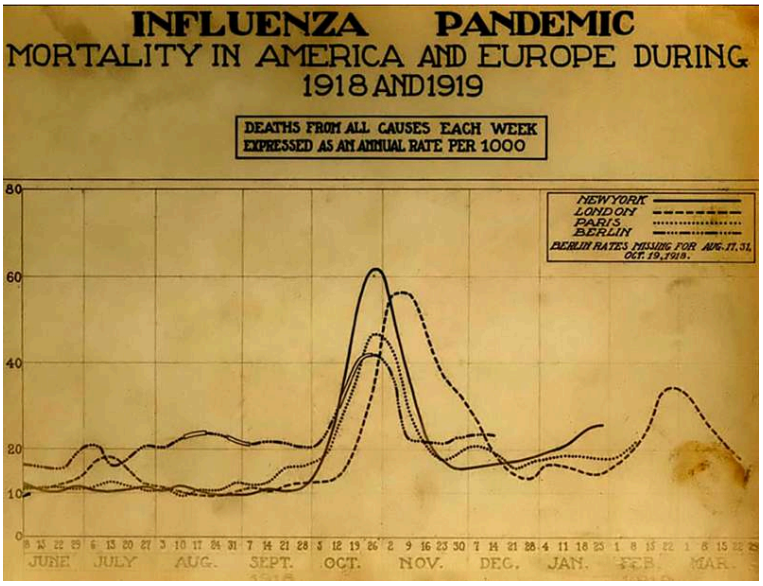
To do that, we study *evidence* about

- the **causes** of a disease (or injury)
- the **factors** associated with greater risk (a higher chance of getting the disease) or greater resiliency(a higher chance of resisting the disease or recovering)
- and the **interventions** that have been proven to work (to prevent or stop the spread).

Epidemiology is the core public health science, the science most closely associated with public health efforts. **Epidemiology is the study of the causes, distribution and control of diseases in populations.** That is, it involves monitoring how diseases (or injuries) affect populations, their causes, how they respond to different interventions, and how they change over time.

Public health is nearly always interdisciplinary. Many sciences contribute to public health: biology, toxicology, nutrition, social psychology, sociology and many other fields of study play a role in public health. *Can you see how these sciences complement (work together with) epidemiology?*

In Chapter 3 of ICPH, epidemiology is defined and its history is briefly reviewed. The importance of **rates** in describing disease occurrence in populations is explained, and examples of **different kinds of rates** are provided. The process of **reporting** births, deaths, and disease is discussed. Several **important indicators of health status** are reviewed, and several sources of standardized data are provided. Finally, the **basic types of epidemiological studies** and the **criteria for determining causation** are explained .



Flu chart image courtesy of the National Museum of Health and Medicine, via Wikipedia.

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4.3: What Does “Evidence-Based Practice” Mean?

Evidence-based public health relies on epidemiological data and research. In this chapter and the next we will look into understanding some aspects of epidemiology and how it relates to public health.

Evidence-based practice means “systematically finding, appraising, and using evidence as the basis for decision-making” (Seabert et al., 2022 p.115). This means that before we create programs or propose policies, we should gather as much evidence on the problem and potential solutions as possible, assess the applicability of available evidence to the current problem, and then use this knowledge to help guide decisions on whether or how to move forward. There may have been programs or policies similar to our ideas that have already been tried in the target population or other communities. What if there is evidence that this particular solution doesn’t work well? We certainly wouldn’t want to propose a program or policy that had already been proven to be ineffective. Or perhaps there is evidence that certain implementation methods were more effective than others. We would want to use that insight to make our interventions or policies more likely to work.

Two types of evidence can be used in this process: objective and subjective.

Objective evidence comes in the form of scientific studies and data collection. Typically, objective evidence includes things that can be measured or observed and is often expressed in numbers or percentages.

Subjective evidence may be in the form of expert advice or personal experiences and observations from community stakeholders. Subjective evidence includes personal accounts, individual experiences and stories - this type of evidence is often based on the perceptions of the person observing something or being interviewed.

In practice, objective evidence is often valued more highly than subjective evidence, in large part because well-done research uses several methods to reduce bias and misinterpretation. Objective data also tends to be more reliable than individual experiences or opinions. For example, a community member might perceive that homelessness is not a problem for their city because they used to see many tents and makeshift shelters on sidewalks in their neighborhood, and recently the sidewalks have been clear. But the objective data may show a more complex picture: perhaps the individuals who had been living in those makeshift shelters had been forced to relocate but were still unhoused.

Important to consider:

1. Care should also be taken in **interpreting research and applying objective evidence to different situations**. Just because a particular program worked for one community doesn’t mean it will work in another. Subjective evidence from stakeholders in the community or professional experience from public health workers should still be valued. For example, a community health worker may know from their work that many of the unhoused are not living on the street - they are living in their cars or “couch-surfing”, and therefore, they might not be aware of or have access to social services. Scientific studies may leave out certain populations, or we may not yet have scientific research available for a specific health problem. Therefore, it’s important to consider all sources of evidence when using an evidence-based approach to public health.

2. As we try to solve health problems with evidence-based practice, we must also **consider the time** it may take to establish evidence through research and the risks involved with waiting for an abundance of evidence to be established before we take action. Certainly, our understanding of the determinants of health is far better now than it was in the last century. Advances in technology and research methods continue to elucidate the drivers of health outcomes. As Sir Austin Bradford Hill (one of the researchers who first established the link between cigarette smoking and lung cancer) stated:

> *All scientific work is incomplete - whether it be observational or experimental. All scientific work is liable to be upset or modified by advancing knowledge. That does not confer upon us a freedom to ignore the knowledge we already have, or to postpone the action that it appears to demand at a given time. (Hill, 1965, p. 300)*

Pivotal research like the *British Doctors Study* conducted by Hill and Doll provided the foundation for the surgeon general’s warning about cigarette smoking causing lung disease. Since then, decades of research have supported this causal relationship and have been the practical basis for cigarette advertising bans, lawsuits against tobacco companies, warning labels on cigarettes, smoke-free policies in public spaces, and public health campaigns to reduce smoking. While efforts to reduce smoking have been successful over the decades, newer, similar threats have emerged in the form of e-cigarettes and nicotine vape products. While smoking rates have declined from 20% of adults in 2005 to 11% in 2021 (Centers for Disease Control, 2024),

e-cigarette sales have skyrocketed - increasing by over 58% between 2020 and 2024 (Centers for Disease Control, 2024).



Figure 4.3.1: Domains that influence evidence-based decision making. Jacobs et al (2012).

Reference

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Hill, A. B. (1965). The environment and disease: association or causation? Proceedings of the Royal Society of Medicine, 58(5), 295-300. https://doi.org/10.1177/003591576505800503

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4.4: Public Health Responses to Epidemics

Epidemiology arose out of the need to respond to disease and disasters. Initially, **infectious diseases** (or **communicable diseases**) were the main focus of epidemiology, in particular, large outbreaks of disease (epidemics) and outbreaks of disease on ships (seen as a danger when they would arrive in port in a new location). A key moment in the development of epidemiology was when John Snow discovered the source of the cholera outbreak in London and broke the handle off the Broad Street pump. That story is told in Chapter 1 so if you missed it, go back and take a look now.

Definitions

- **Epidemiology**: study of distribution and determinants of health-related states or events in specified populations. Another way to say this is that epidemiology is the study of the causes, distribution and control of diseases and injuries in a population.
- **Epidemic**: unexpectedly large number of cases of an illness, specific health-related behavior or event, in a particular population
- **Endemic**: disease that occurs regularly in a population as a matter of course
- **Pandemic**: outbreak over wide geographic area (like, multiple continents)

To study and respond to epidemics, measurements of population health are necessary, to determine when a certain disease or other health problem is occurring in large numbers. In the next few pages, we examine some common health measurements and calculations.

Public Health Responsibilities in an Epidemic

Many parts of the public health infrastructure come into play when there is an epidemic of an infectious disease. Researchers, medical providers, outreach workers, communications specialists, environmental engineers and policy activists are all needed to respond to an epidemic. Some of the standard responses that public health officials often consider using to prevent spread of an infectious disease include the following:

- Isolation or quarantine of the infected persons
- Immunization to change the host's resistance to the infection
- Treatment of the infectious agent through antibiotics or other drugs
- Physical barriers between the microbe and the people (including condoms, mosquito nets, masks)
- Educating the public about how to protect themselves from infection and dispelling harmful myths

Questions to Think About:

- When you look back at the history of public health from Chapter 1, which of these practices are long-established and which ones are newer?
- How did you seen these responsibilities play out in the Covid-19 pandemic, in the US and elsewhere?
- How would you assess the importance of public health readiness -- being ready for the next epidemic before it arrives?

References

Seabert, D., McKenzie, J. F., & Pinger, R. R. (2021). *McKenzie's An Introduction to Community & Public Health*. Jones & Bartlett Learning.

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4.5: Burden of Disease and Epidemiology

Deciding which diseases are most important is a complex challenge for governments and healthcare providers. While personal experience influences individual priorities, public health requires a population-level assessment. To allocate resources effectively, policymakers rely on the concept of **burden of disease**, which is the health consequences of the disease, including disability and fatal outcomes. Understanding this burden is crucial for developing interventions and delivering services to control the spread of disease, which helps to reduce population health inequities (National Collaborating Centre for Infectious Diseases, 2016).



Figure 4.5.1: Free for use under the Pixabay Content License; Wphoto via Pixabay https://pixabay.com/photos/quarantin...sease-4959919/

When gathering data to analyze the burden of a disease, public health uses epidemiology methods to help gather and interpret data. **Epidemiology** is the study of diseases, health states, and health outcomes. Epidemiologists are especially interested in how diseases and conditions are distributed throughout populations and finding those factors that increase or decrease the risk of a particular disease, and finding the cause of the disease or condition. Epidemiologists attempt to study associations between "people" and "place"; this is called **group association** (Riegelman & Kirkwood, 2025). Questions that epidemiologists hope to answer are:

- Does a disease affect one population more than another? Does the number of people affected increase or decrease over time?
- What are the associations between biological factors, exposures to pathogens or toxins, the environment, and behaviors that could influence disease states and health outcomes?
- Are there ways to increase the average lifespan and make those years healthy and enjoyable?
- Can we still identify and stop a disease or condition from hurting more people even if we don't know the exact cause?

Historically, epidemiology was first used to help identify causes and risk factors for infectious diseases. This is still an essential role for epidemiologists around the world, especially as we experience new and re-emerging contagious diseases. However, chronic diseases, behavioral health problems, injuries, and violence are now also studied using epidemiology techniques.

In this chapter, we'll go over some of the basic tools that epidemiologists use to understand health problems and potentially how to solve them.

Reference

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4.6: Public Health Statistics

Public health uses data -- including a lot of numerical data -- to understand what's happening at the level of population health. Public health relies on a number of different types of statistics that are routinely collected, such as births, deaths, hospitalizations, and rates of disease. All of these are discussed below.

Health statistics are analyzed by epidemiologists and biostatisticians (think of it as "math for the life sciences") to (a) describe what's happening in a population and (b) understand the relationships among different exposures and the diseases or illnesses associated with them.

Vital statistics, prevalence, incidence, life expectancies -- all these are examples of health statistics.

Like all sciences, epidemiology has to deal with a degree of uncertainty. That isn't because science isn't working -- it's because it is the nature of science to be constantly evolving. When I was a kid, the idea that earthquakes were due to movement of huge plates on the earth (plate tectonics) was just one theory -- now it is the dominant explanation for why earthquakes arise. When I was a kid, we thought ulcers were caused by stress and if you had an ulcer, you were told to drink milk and rest more. Now we know that stomach ulcers are caused by bacteria and you take an antibiotic, not milk, to cure it. Knowledge is expanding through a slow accumulation of many different studies that clarify the answer to scientific questions over time. In the Covid-19 epidemic, you may remember, there have been a number of scientific discoveries -- and also some scientific mistakes. For example, it took a very long time for epidemiologists to confirm that covid could spread via **aerosols**, not just **droplets**. (Both aerosols and droplets are small water drops in the air that contain the virus, but they behave very differently. Droplets can only travel about 6 feet and they fairly quickly fall to the ground. Aerosols are much smaller and can stay suspended in air for a longer time and can move around with air currents. Masks are ideal for protecting against the transmission of covid through droplets. Ventilation is probably our best tool for protecting against the transmission of covid through aerosols -- although masks also help.) **Uncertainty is a natural part of the scientific process.**

Statistical analysis often produces a result with a "margin of error." For example, in elections, you might see that Candidate A is leading over Candidate B by a margin of "two to five percentage points." That's a margin of error -- they know the real number is somewhere between two and five, but they can't quite pin it down. Still, it provides a useful snapshot of what's happening in the election campaign. Similarly, in public health, we might have a "margin of error" around the measurement of how often an exposure is associated with a disease. For example, in the US, people who smoke tobacco die an average of 10 years younger than people who never smoked tobacco. That 10 years isn't a precise number -- there's an association between tobacco and premature death that falls in a margin of error around 10 years. When the "margin of error" is all above zero, we can still be certain that the exposure to tobacco (in this case) is truly related to the health outcome (premature death). When the "margin of error" includes the number 0, then we can't be sure. For example, in that election example, if we said that Candidate A is ahead of Candidate B by 3 percentage points, give or take 4 points, then our margin of error is -1 to 7% (taking that 3% and looking at the numbers 4 points below and 4 points above.) If Candidate A is -1% "ahead" then they aren't really ahead! It would be more accurate to say the two Candidates right now are tied, and we can't tell who is ahead, though it seems Candidate A might be taking the lead.

Below, we discuss various types of health statistics that public health uses most often.

OPTIONAL Video defining epidemiology

The epidemiologist in this video speaks rather fast, but **he does an excellent job of explaining what epidemiology is, in just four minutes with useful diagrams**. You can turn on captions (the CC symbol on the bottom bar of the video) if you like. (It may take a moment to load, because I set it to start about 2 minutes into the video.) I appreciate how he breaks down epidemiology's focus on examining the connection between an **exposure** to a germ or a condition and the **health outcome** that it might produce.

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4.7: Vital Statistics

Some of the primary types of data that epidemiologists track are births and deaths. These data are named **vital statistics** and are recorded by the government. In the United States, hospitals and health professionals are required to report both births and deaths, as well as many different diseases and conditions. A list of reportable diseases to the Centers for Disease Control can be found here (Medline Plus, 2025). It is important to note that birth and death certificate forms filled out by the healthcare professional also include some information pertinent to epidemiology, such as demographics, information about the parents, pregnancy and birth for birth certificates, and cause of death.

The following are important terms used in tracking vital statistics:

Natality refers to the number of live births in a given period relative to the number of people in a particular population.

Fertility rate refers to the number of live births per number of women in the population of childbearing age (considered 15-44 years old). Pregnancy and birth are possible outside of that range, but they are much more rare (National Vital Statistics System, 2025).

Natality and fertility of a specific population or comparisons over time can provide information on whether or not a population is growing, what resources might be needed (i.e. for maternal and infant care), and changes in family planning or contraception use trends.

Morbidity refers to the disease or condition rate - typically expressed as **incidence** (new cases) and **prevalence** (current cases).

Mortality refers to the death rate for a particular population, disease, or condition being studied. Of course, death is the 100% predictable end of every human life, but when and how death occurs is influenced by a variety of factors - some of which can be changed.

Studying the morbidity and mortality rates of different diseases or conditions can inform where public health efforts need to focus the most. For example, if the population in a specific neighborhood has a higher rate of cancer, that might prompt an investigation of environmental exposures to cancer-causing toxins (**carcinogens**) in that area. Or if one racial demographic has higher mortality rates from a specific disease than the overall average, perhaps outreach, healthcare access, and screenings for this group may need to be improved to catch the disease earlier and provide better treatment options. The goal of public health related to morbidity and mortality is to extend the years of healthy life for all people and reduce or eliminate preventable causes of disease, disability, and death.

One of the biggest factors related to the increasing risk of death from any cause is age. The older we get, the higher the risk becomes. Therefore, mortality rates for a particular population may not always be comparable to another population due to age differences. For example, if we compare mortality rates in Florida to those in Alaska, it might seem that Florida has a substantially higher mortality rate. However, Florida is also home to many people over the age of 65, which could skew their death rate to be higher due to more deaths occurring in aging populations. In 2020, older adults made up over 21% of Florida's residents and only 13% of Alaska's. Instead of using the "crude" or absolute mortality rate then, an **age-adjusted** mortality rate will more accurately reflect these outcomes between different populations (Seabert, McKenzie, & Pinger, R, 2022). Age-adjusted mortality rates attempt to control mathematically for these differences and allow for the comparison of mortality rates between different populations. The mathematical methods used to calculate age-adjusted rates are beyond the scope of this text, but it is important to understand what these terms mean when comparing vital statistics.

To further understand the burden of disease, it is important to know how **rate** impacts a health problem (please note, the below rate explanation was a condensed summary from Riegelman & Kirkwood, 2025 p31). A rate is simply a measurement that compares two different quantities and is expressed via the numerator and denominator. In epidemiological studies, the **numerator** is a number of individuals that is also included in the denominator. When looking at a rate of an event, the numerator measures the times an event has happened, for example, breast cancer. The denominator measures the times the event has the possibility of happening. Many times, epidemiologists use the whole population as the denominator, but in certain circumstances, one would use only the **at-risk population** as the denominator. For instance, it would be appropriate to use the at-risk population, instead of the whole population, as the denominator when looking at a disease that is only found in a certain number of the population, and it is clearly understood and logic to exclude the other part of the population, for example when studying prostate cancer the denominator should include only the males portion of the population. In running an analysis of the burden of a disease,

it is important to look at two different types of rates:

Incidence rates: The number of new cases of the disease in a certain period (Centers for Disease Control, 2022). Incidence rate is used to identify the cause of the problem, **etiology**. Mortality rate is also expressed via incidence rate. In a situation when most people who develop a disease die from it, as when people are diagnosed with pancreatic cancer (one of the known silent cancers), the incidence rate and mortality are similar. This comparison between mortality and incidence rate is important because it provides epidemiologists a probability of those who are diagnosed with the disease dying from it, and this is called **fatality-rate.** The fatality-rate for pancreatic cancer between 2014 and 2020 was 87% (National Institute of Health, 2024). Below is the equation used to calculate the incidence rate:

Incidence rates = number of new cases of a disease in a year/ number of people in the at-risk population

Prevalence rate: The number of cases of a disease present during a particular time (Centers for Disease Control, 2023). The prevalence rate is important in looking at the burden of disease because it provides us with the proportion of the people who have the disease in a certain period of time and therefore, it helps to identify the need for public health services. It is important to note that the limitation of prevalence rate is that, in some cases, the prevalence will be low because sometimes those that have the disease have it for a short period, such is the case with pancreatic cancer. Pancreatic cancer is a cancer that has subtle symptoms and many times is detected only during an autopsy (Rawla, Sunkara, & Gaduputi, 2019).

Prevalence rates = number of people living with a particular disease/number of people in the at-risk population

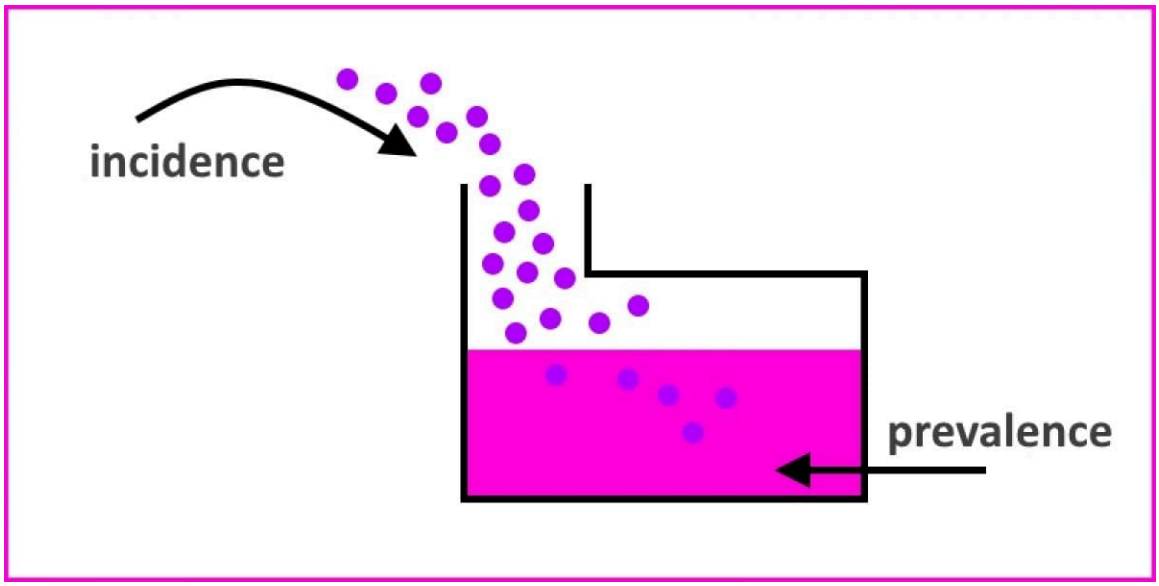


Figure 4.7.1: Incidence and prevalence image. Free for use under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License; Principles of Epidemiology by H. Giovanni Antunez via Pressbooks https://minnstate.pressbooks.pub/hga...-calculations/

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4.8: Health Disparities and Inequalities

In this book, the terms "health disparities," "health inequities," and "health inequalities" are usually used interchangeably. In my own reading of the literature, I've noticed that the term "disparities" is more often used by US-based researchers and "inequities" more commonly by international researchers. They all point to preventable and unfair differences in health outcomes between populations. Below, however, I share a discussion of some of the nuances in these terms, from Erin Calderone, to better frame how public health works toward greater health equity.

Health disparities are measurable differences (incidence, prevalence, and mortality) in health outcomes among specific populations. These health disparities are one reason why HIV, viral hepatitis, STDs, and TB take a greater toll in one population group over another (CDC, 2024). Race and ethnicity are created and shaped by societal perceptions, historical policies, and practices (social constructs). Race and ethnicity are, both, some of the main factors in health inequalities (Williams et al, 2010).

Health inequalities arise from social economic, environmental, and structural differences among groups within a population. These inequalities are rooted in both historical and ongoing institutional and societal structures, policies, and norms (National Academy of Sciences, 2017). In the United States, health disparities among racial and ethnic groups include higher rates of chronic disease and premature death in comparison to rates in the Caucasian population. The disparities are due to a variety of factors, including racial discrimination, low income and education levels, poor residential environments, lack of medical insurance, and treatment at low-quality hospitals.

A recent report from the Office of Minority Health, an agency of the U.S. Department of Health and Human Services (DHHS), outlines how federal policies have caused and maintained structural disadvantages to obtaining long, healthy lives in minoritized communities. This report also uses the term *minoritized groups* rather than *minority or minorities* to further describe how structures and policies have affected populations, rather than these disparities being a result of numbers of a specific demographic in a population. (These terms will also be adopted in this text). The assertion is that racial and ethnic disparities in health and health outcomes are significantly caused or made worse by historical or existing governmental policies, and therefore a path toward health equity involves new federal policies and accountability (National Academies of Sciences, Engineering, and Medicine, 2023).

The United States' early history of Native American extermination, land seizure, kidnapping of native children, and required assimilation has caused, and continues to perpetuate significant health repercussions for American Indians and Alaskan Natives (AIAN). Concurrently, the forced immigration and enslavement of Africans, subsequent Jim Crow laws, and even purposeful public health abuses (such as the Tuskegee Syphilis Study), have negatively affected the health of Black Americans for centuries. Additionally, federal policies relating to immigration and social services also play a role in health disparities, particularly those experienced by immigrants and asylum seekers, and their children. Although health disparities are also correlated with poverty and lack of education, those racial and ethnic inequities exist at all socioeconomic strata - indicating that the explanation lies beyond income or education alone. A section in the report summarizes just some of the health inequities in America:

> *There are higher rates of childhood asthma among low-income households, higher morbidity and mortality from chronic diseases among individuals with lower educational attainment, and higher exposure to air pollution among residents of disinvested communities—disproportionately individuals who are racially and ethnically minoritized. Moreover, the effects of the structural determinants of health on many health outcomes persist when accounting for income and education* (National Academies of Sciences, Engineering, and Medicine, 2023).

According to an earlier DHHS Health Equity Report in 2019-2020, significant racial disparities in health and social determinants of health have persisted across the decades. Although measures like life expectancy and educational status have improved for all Americans, there are still differences in these and other measures between racial groups. Racially minoritized groups have twice or higher the poverty rates as non-Hispanic Whites do (Health Resources and Services Administration, 2020). According to the most recent report from the U.S. Census Bureau tracking poverty rates for the year 2022, the poverty rate for those identifying as non-Hispanic White or Asian was 8.6%, whereas it was 17.1% and 16.9% for those identifying as Black and Hispanic respectively, and 25% for American Indian and Alaskan Natives (Shrider & Creamer, 2023).

This disparity in poverty rates is also reflected in the increased likelihood of minoritized populations living in impoverished zip codes. Southeastern and Southwestern states tend to have the highest poverty rates, a trend which has remained consistent over time, and is consistent with higher unemployment rates in these areas. Neighborhoods that have been historically racially segregated as "non-White" have associations with lower life expectancy and higher rates of homicide, infant mortality, and

all-cause mortality, as well as higher rates of mental distress, community violence, excessive drinking and smoking, and HIV prevalence (Health Resources and Services Administration, 2020). These neighborhoods often also have higher exposures to environmental toxins like air pollution and lead (Doctrow, 2022).

According to the KFF (formerly known as the Kaiser Family Foundation) health tracking polling, many disparities exist with how safe minoritized groups feel in their homes and neighborhoods, and how discrimination impacts everything from housing to healthcare. This foundation conducted a survey on racism, discrimination, and health in a representative sample of 6,000 Americans in 2023. Hispanic, Black, Asian and AIAN individuals are less likely to report feeling safe in their neighborhoods. About twice as many racially minoritized respondents reported a family member being victimized by violence as did White respondents. Also consistent with earlier surveys, minoritized groups are significantly more likely to have a family member who has experienced mistreatment from law enforcement (Artiga, 2023). “Nearly half of Black Americans say they have been afraid their life was in danger due to their racial background,” (Reich, 2022). All of these disparities impact health on multiple levels across the lifespan; not the least of which is the heightened chronic stress due to discrimination, racism, and poverty.

Systemic Racism

Systemic and structural racism cause disparities in access to goods, services, and opportunities using laws, policies, practices, or attitudes. Systemic racism is often hidden, and practices or social values are accepted as the norm without questioning whether racism had any influence on their creation. Below are two examples of how systemic and structural racism continue to impact racially minoritized communities and cause health inequities.

Systemic racism has influenced neighborhoods through redlining: a practice of segregating Black Americans into urban neighborhoods and denying them residential loans. Black neighborhoods were considered financial “risks” by banks and lenders. Newly-built housing tracts often came with contracts requiring that anyone who purchased one of the new houses could not sell it later on to folks from other races or ethnicities - thus keeping suburban communities segregated. Even when the Fair Housing Act of 1968 opened up FHA loans for Black Americans legally, the practice of discrimination continued on within financial institutions. At the same time, home prices continued to increase in the suburbs, which continued to keep loans out of reach for many (Rose, 2023). A majority of those communities that were redlined almost a century ago are still low income, minoritized neighborhoods. Since home ownership is one of the primary mechanisms of building wealth for the middle class, this had a generational effect on racial wealth disparities (Reich, 2019).

Structural racism also influences access to education and economic advancement via funding for public schools. Public schools are funded primarily by state taxes and local property taxes, with much smaller portions from federal funds or community fundraising. This means that if home values are lower in a particular neighborhood, their school district gets less money compared to a school district with higher home values. In those states that have approved them, voucher programs also redirect tax dollars from public schools into private, charter schools - cutting into public school budgets even further. Schools in lower income neighborhoods tend to have more trouble attracting and maintaining teachers, and they may spend more of their limited resources on safety measures and behavioral interventions rather than enhancing learning programs (Reich, 2023). In school, young Black men are more likely to receive harsher punishments, and schools are more likely to call the police when disciplining them - thus increasing the risk of incarceration and eroding trust (Braveman et al., 2022). In these ways and many others, both current and historic policies continue to create structures and systems that provide fewer opportunities for wealth and impact long-term health outcomes in racially minoritized neighborhoods.

To conclude:

Although the terms “disparities” and “inequities” are often used interchangeably (even in this text), it is the inequities in health opportunities that often lead to the disparities we see in health outcomes of different groups. In other words, we are recognizing that there are differences in how long we live and what diseases affect us (and how seriously sick we become) that have more to do with social, economic, political, and environmental factors than any genetic or biological influence. Why do people in one zip code live longer than those in another? Why is income or education level such a strong predictor of health? In recognizing that the social determinants of health are perhaps the strongest predictors of overall population health. “Health inequities refer to inequalities that are unfair, unjust, avoidable or unnecessary, and that can be reduced or remedied through policy action” (Health Resources & Services Administration, 2020). Pursuing health equity - providing opportunities for all to attain their highest level of health - is a paramount role for public health (U.S. Department of Health and Human Services, 2024).

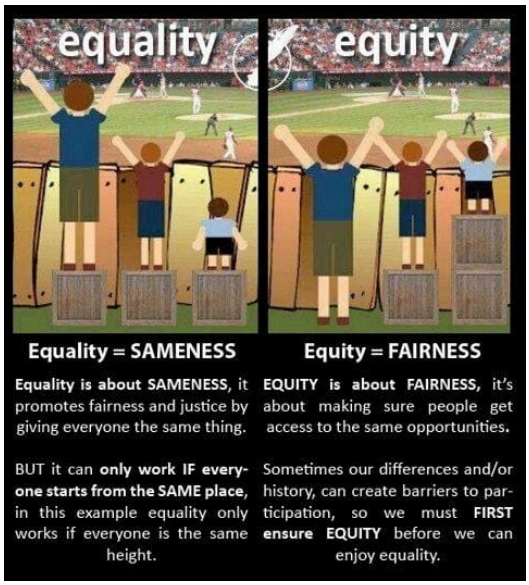


Figure 4.8.1: Equality vs Equity. Content License not provided; The Sollis Partnership Ltd via https://www.sollis.co.uk/2017/12/13/...alth-inequity/

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4.9: Cases and Rates

What do we count when we are monitoring or measuring health? Usually we count **cases** of a certain disease or injury. Often, thinking about prevention, we also monitor health behaviors(like smoking, drinking, driving fast)and community conditions that affect health (like the number of liquor stores in a neighborhood).

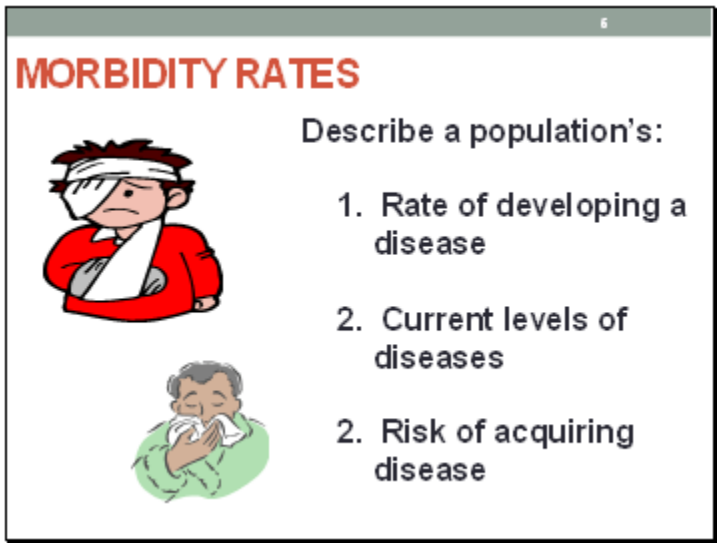
When we count how many cases happened, we get a sense of HOW MANY or HOW MUCH. The **number of cases** is sometimes referred to as a **count**, not surprisingly. For example, in 2013 there were 135 new cases of bladder cancer reported in San Francisco.

But was 135 new cases of bladder cancer in San Francisco a lot or a little? Was it an unexpectedly large number (an epidemic)? Increasing or decreasing? To answer this kind of question, we need to look at **rates**.

Similar words, different meanings

MorBIDity is a word that refers to illness. A morbidity rate tells us how many people are sick or injured.

MorTALity is a word that refers to death (like a "mortal wound" is a deadly wound). A mortality rate tells us how many people have died.



The Importance of Rates

Rates allow for comparison of outbreaks at different times or in different places

- **Cases =people afflicted** (those who are sick)
- **Rates =** number of events in a given population over a given period of time
- **Examples of common rates**:
  - natality (birth)
  - morbidity (sickness)
  - mortality or fatality (death) rates
  - attack rates (rate of illness in a specific outbreak)
- **Population at Risk:** those susceptible to particular disease or condition

For example, in 2016 there were 88 homicides in Oakland, CA. In New York, NY there were 335 homicides. Clearly, that means there were more total deaths by homicide in New York than in Oakland , 247 more. But which city had a higher homicide **rate**?

To answer that, you would need to know the size of the population at risk. For homicide, the population at risk is everyone who is a resident of that city -- it isn't an injury that can only happen to one gender, one age group, etc. (This is true, even though some populations are at MORE risk that others.) In contrast, for a disease like testicular cancer the population at risk would only include male-bodied individuals.

New York City had a population of roughly 8.5 million (that's 8,500,000, rounded off).

Oakland had a population of roughly 383,000.

So, New York hada homicide rate of 335 divided by 8.5 million -- which comes out roughly to 4 homicides for every 100,000 people. Oakland had a homicide rate of 88 divided by 383,000, and that number is roughly 23 homicides for every 100,000 people.

So, while New York has a higher number of *cases,* Oakland has a higher *rate* of homicides.

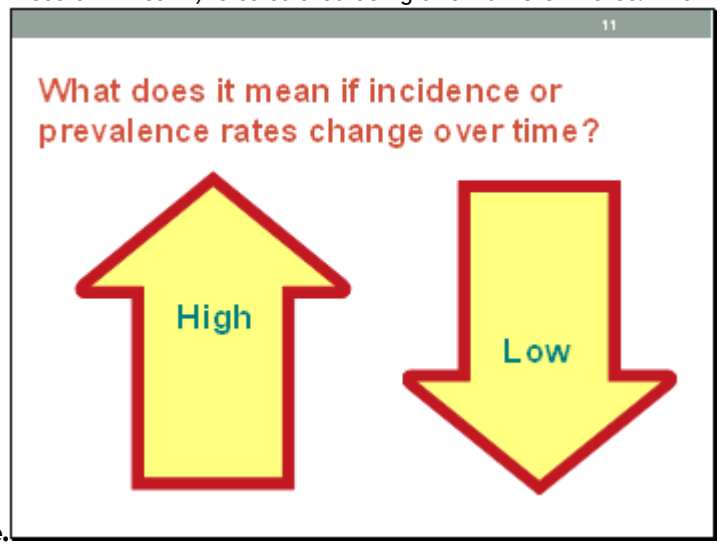
Rates let us compare apples to apples and oranges to oranges, as the saying goes. You can use rates to compare the scope of a disease, injury, or health behavior in cities (or countries) of different populations, or across different times.

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4.10: Morbidity and Mortality

The mortality or fatality rate is the rate at which people die, either from a specific cause or from all causes. At an individual level, we all have the same death rate -- we each get exactly one death! But mortality rates vary across populations. In a population with high rates of disease, for example, there may be a higher overall death rate (more deaths each year) than in a healthier population.

Morbidity (which means sickness or ill health) is calculated using a few different rates. Two main rates to measure morbidity are **prevalence and incidence.**



Prevalence is the proportion of the population affected by an illness or injury or other health problem at a given time. For example, if a town reports a prevalence of 10% for asthma in 2020, it means that in that specific year, one in ten people have asthma in that town.

Incidence is the rate of NEW cases -- for example, we could calculate the proportion of the healthy population that got infected with influenza (flu) in 2015, and that would be the annual incidence of influenza (flu) for that year. The incidence rate counts new cases of flu and divides that number by the population at risk. It does NOT include cases of flu that were diagnosed before January 1, 2015, even if the person is still sick at the start of 2015.

For **chronic conditions (chronic diseases),** we usually use prevalence rates and NOT incidence rates, since these diseases develop slowly and last a long time.

Your textbook also discusses **attack rate,** an incidence rate calculated for a particular population for a *single disease outbreak*; expressed as a percentage, useful with any illness or injury that comes on quickly. For example, if there was a sudden outbreak of disease on an airplane, you would want to know what proportion of the passengers on that flight got sick. You could calculate the **attack rate** to understand that.

Here is a video example of calculating incidence and prevalence (about 3 minutes, *optional*).

If you want to see even more about how incidence and prevalence interact in determining the overall burden of disease in a population, you might enjoy this short video (4 minutes) using the metaphor of a bathtub.

Age-Adjusted Rates

Different populations are of different ages.

For example, Florida has a higher percent of residents over age 60 than California. So if you are looking at disease that affects older adults (like Alzheimer's disease), you have to take that into account when comparing Florida and California. For that reason, we have **age-adjusted rates**. (See the example in Chapter 3 of ICPH about Alaska versus Florida.)

Recently, I have seen some controversy about whether California or Florida, with their different policy responses to Covid-19, did a better job of protecting older adults from death from covid. When the data is age-adjusted, the rates between the two states look much more similar than they do if you only look at the number of adults over age 65 who died.

Rates can be adjusted for other factors too, besides the age-composition of the population. You don't need to know the math that goes into making those adjustments -- but I do want you to understand why we adjust rates: it is to make better and fairer comparisons.

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4.11: Tracking the Spread of Covid-19

During the Covid-19 pandemic, caused by the virus SARS-CoV-2, many of us have heard a lot of different measurements or rates discussed in the news. These measurements (or **indicators**) are tools that epidemiologists use to understand how a disease is spreading and how to control or prevent it.

Indicators

In addition to counting **cases,**measuring the **incidence rate**, and calculating the **mortality rate**, there are some other indicators used in addressing an epidemic like Covid-19. Here are a few of the main ones:



Reproduction number or R0, pronounced "R nought": This is a calculation of how fast the disease is spreading. R0 measures how many new people catch the disease from a single case, on average. If the R0 is 1, that means for each person who gets the disease spreads it to only one person -- this would make the rate of disease stay flat, not going up or down. When the R0 is higher than 1, the rate of disease (morbidity rate) will increase, and when R0 is less than one, the rate will decrease. While every disease has a *theoretical* R0 that's fixed (for how many people would catch the disease from a single case in a population with 0 immunity), in practice, it changes over time and from place to place. For example, in a location where people wear masks routinely, the R0 will be lower than in a place where people seldom wear masks, because masks reduce the transmission of disease.

Case Fatality Rate (CFR): This is a rate that calculates the proportion of people who die, out of all the confirmed cases. This rate is not FIXED for a given disease, since a lot depends on the age of the infected person, what healthcare is available, and other factors that change. In the last 18 months, we have greatly reduced the case fatality rate of Covid-19 through improved treatment for the disease -- though it still has a much higher case fatality rate than the flu or many other common diseases. A related rate is the **infection fatality rate (IFR)**, which is the proportion of people who die out of all the cases, period -- including those that are not diagnosed or confirmed. Since we cannot know the real number of people infected at any given time, we have to use *estimates* for the IFR -- but we can use actual counts for the CFR. When an outbreak is new and less in known about how to treat a disease, fatality rates are likely to be higher. Also, when an epidemic surges, as with the Delta variant surge in summer/fall 2021, fatality rates go up, because healthcare systems get overwhelmed.

Positivity Rate This is the proportion of positive tests out of all the tests given to detect a disease. For example, on October 5, 2020 in San Francisco, the positivity rate was 0.5%, and on January 6, 2021, the positivity rate was 10 times higher, at 5.0%. The rate on September 9, 2021 was 3%. To get a reliable positivity rate, you have to do A LOT of testing -- so you can be sure the tests are reflecting what's really going on in the population.

Hospitalization Rate The hospitalization rate represents the percent of the population in a given area that are hospitalized with a positive Covid-19 test. It varies a lot by age and by location. There is a lot of attention right now on hospitalization rates, both because some hospitals are overwhelmed right now, and because everyone is looking to see if the vaccines are working to prevent

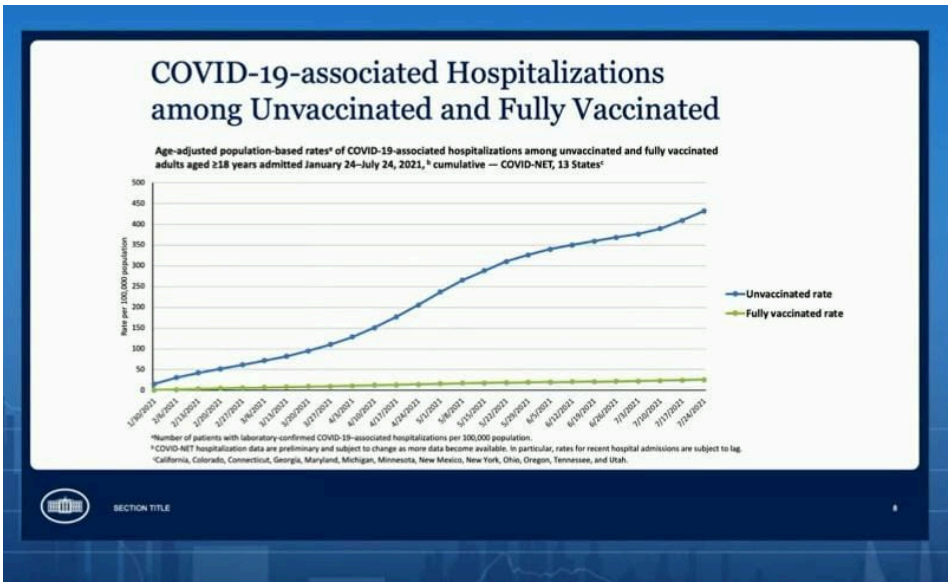
hospitalizations and death. This graphic of what's happening with hospitalization rates during the Delta surge gives you a sense of how well they are working.

CDC's focus switching from case rates to hospitalization rates in assessing risks

Through the first two years of the pandemic, a lot of focus has been placed on case rates -- how many people are testing positive? Some people with positive test results (cases) will become ill, while others will not get sick, or have only mild symptoms.

With an increasing proportion of the population having some level of immunity now, either through past infection or through vaccination, or both, along with the *relatively* milder symptoms of the Omicron variant, the CDC has switched their focus to give more weight to hospitalization rates when they rate communities for risk. This is more similar to how other diseases are monitored -- we don't test everyone for flu, for example; we gauge how bad the flu season is by hospitalizations and deaths.

There are pros and cons of this approach! As covid has about a 2 week lag time between infection and hospitalization, by the time the hospitalization rate goes up, you can assume that a lot of people are already infected. Monitoring cases and test positivity lets you respond more quickly to changes in the prevalence of the disease. But the focus on hospitalization is a better measure of the impact of the disease and the needs of health systems for support. What do you think is the measure that is most important to focus on?



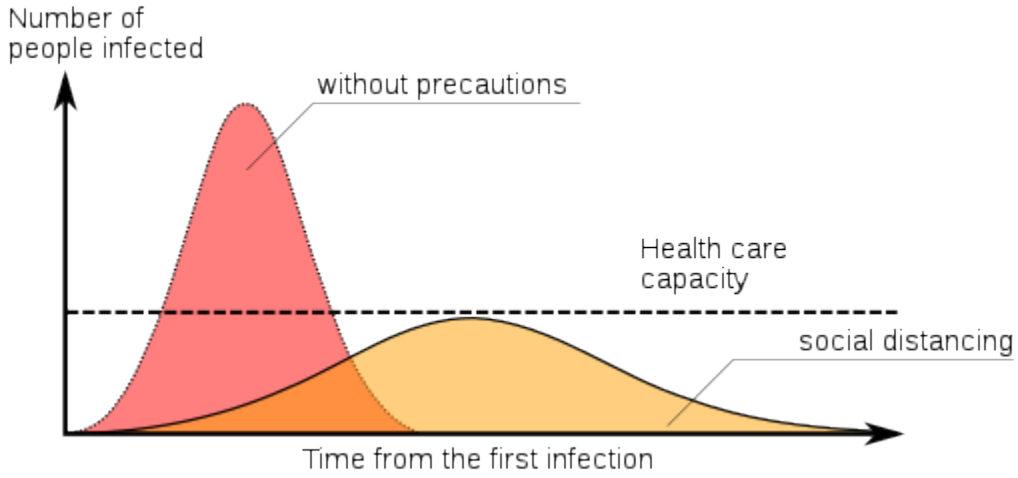
ICU bed capacity This rate is calculated as a way to monitor how ready the hospitals are to receive Covid-19 patients who need intensive care. When the ICU bed capacity is low, hospitals may repurpose other rooms in the hospital to attend patients, transfer patients to other hospitals, or open temporary "field" hospitals. The ICU bed capacity isn't just a count of beds -- it also depends on having nurses and other personnel available to staff the ICU. And keep in mind, some of those beds are needed for patients with other diseases or injuries, besides Covid.

In 2020, you also may have heard about "**flattening the curve**". Flattening the curve does not make the epidemic go away, but it does save lives, by slowing things down. That way, the hospitals aren't so overwhelmed and more people can get the medical attention they need. The idea is to keep the number of people who are sick low enough that the hospital capacity can respond adequately.

In 2021, with the more-contagious Delta variant of the SARS-CoV-2 virus that causes Covid, we again saw hospitals in some parts of the country running out of ICU beds. This is primarily occurring in areas of the country with low rates of vaccination. While the Covid vaccines do not entirely prevent a person from *getting* Covid (infections), they do a very good job at keeping people out of the hospital and reducing the mortality rate.

In the 2022 Omicron wave of covid, we saw *many more people* getting infected -- the R0 went up -- but with a *much lower*

rate of hospitalization and death, because the virus itself is less virulent and because most people had acquired some degree of immunity -- either because they were vaccinated, or because they had covid before, or both.



When we take precautions -- or **mitigate** the risks -- through social distancing, masks, good ventilation, and no crowds, a lot of people still get sick, but they are more likely to live through it. Why? Because the healthcare capacity -- hospitals, nurses, doctors, medications, personal protective equipment, syringes, etc. -- is more available when there are fewer patients needing care at once.

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4.12: Reporting Births, Deaths, Diagnoses

Here's a typical headline you might see: "Colon Cancer Deaths Rise Among Younger Adults, and No One Knows Why." Did you ever wonder where journalists get statistics like that?

They usually get them from public health sources. 

To notice sharp changes in mortality (like this news story about colon cancer), we have to keep track of what people die of. To compare different populations over time, we need to be systematic about tracking statistics in the same way across the country, and for some health statistics, across the world.

This is common sense -- if you want to know how much money you spend, you have to write it down, and if you want to know if you are able to do more pushups in November than you can in April, you have to write it down and look at the data-- and putting it into systems that can be used everywhere. So, health departments across the US report on all births and deaths (called "vital statistics") and on rates of disease.

In the case of certain infectious diseases, especially those that could become epidemic, they are called **notifiable diseases** because health departments must notify the Centers for Disease Control and Prevention (CDC) on new cases identified each week. The causes of death are reported on death certificates, which allows us to track mortality rates from a wide array of causes (not just infectious diseases).

Standardized Measurements of Health Status of Populations

When you go to see a doctor, they probably take your blood pressure and temperature every time you have an appointment. These are quick indicators of a person's health. Similarly, when we look at a population's health, there are some measurements that we check every time, as they are good indicators of overall health of the population.

Three of the most important categories of population health measures are mortality statistics, life expectancy and years of potential life lost.

- **Mortality statistics** (death statistics) are the most reliable measure of a population's health. You will see next week, when we look at health inequalities, that mortality statistics are a key measure used when comparing the health of different populations.
- **Life expectancy** is the average number of years a person from a specific cohort is projected to live from a given point in time. Most commonly you will see life expectancy from birth -- that is, for a person born today, how many years can they be expected to live? Sometimes you will see life expectancy reported from another age. For example, retirement planners might want to know, if a person makes it to age 65, how much longer can they expect to live?There are large differences in life expectancy among different populations in the US (men vs. women, different races, different educational levels). There are even greater differences (inequalities) between life expectancy in poor countries and rich countries around the world.

I mentioned that **life expectancy changes over time.** It is a key thing that public health professionals keep their eye on. The Swedish statistician Hans Rosling has made some beautiful and entertaining graphics to talk about global public health improving over time, using life expectancy as the indicator. *Optional*: Take a moment to explore the data on **Hans Rosling's Gapminder**

website, which enables you to try out different types of charts to answer your own questions.

- **Years of potential life lost (YPLL)** is a measure of how many people are dying young from a certain cause. It is calculated by subtracting a person's age at death from a standard age, usually 75. If you looked at 1000 deaths from childhood cancers, for example, the YPLL would be much higher than if you considered 1000 deaths from lung disease, which usually occurs later in life.

However, if you look at a disease that is very common like heart disease (the leading cause of death in the US), even if it mostly kills older people, the total YPLL is much higher than a less-common cause of death like homicide, simply because more people are affected.

Other measures of population health

There are other measures that seek to assess not only years of life, but something about quality of life, including **disability-adjusted life years** and **health-adjusted life expectancy**. These measures, discussed in your textbook, are commonly used in public health. Some see them as problematic or inadequate measures, as they seem to equate disability with not living at all, or living less. Many people who live with disabilities argue with this. Yet sometimes there can be value to using these measures (DALY and HALE), especially when modern medicine falls into the trap of extending years of life without attention to quality of life. Keep in mind that many people living with disabilities have a high quality of life, and that many barriers to a high quality life are about opportunity and social conditions, not physical health.

Here is an optional short video that does a nice job of explaining YPLL:

Years of Potential Life Lost video

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4.13: Secondary Data

In addition to vital statistics (birth and death records) and other primary sources of public health data, there are many other places that public health people can go to look for relevant statistics.

Here are a few of them.

- Secondary data means data collected by someone else, possibly for another purpose
  - Useful in planning of public heath programs and facilities
- U.S. Census
  - Enumeration of the population
  - Taken every 10 years
  - Gathers data on race, age, income, employment, education, dwelling type, other

- Statistical Abstract of the United States
  - Book published annually by Bureau of Census
  - Summary of statistics on social, political, and economic organization of the United States
- Monthly Vital Statistics Report
  - Vital statistics are summaries of records of major life events: birth, death, marriage, divorce
  - Published by National Center for Health Statistics under the CDC
  - Also calculates death rates by race and age

- Morbidity and Mortality Weekly Report (MMWR)
  - Prepared by CDC from state health department reports
  - Reports morbidity and mortality data by state and region of U.S.
  - Reports outbreaks of disease, environmental hazards, unusual cases, or other public health problems

For our purposes, you don't need to memorize each of these sources. Rather, they can give you **an idea where to look**when you are researching a health topic -- you can ask a librarian for help with accessing these sources. They also can help you to be **a more critical *consumer of information*.** When you see a headline about some new statistic, you can ask, where did that come from? Is in Census data? Is it from an analysis of the notifiable disease records? Is it survey data?

National health surveys are -- as their name says -- *national* in scope. There are many other kinds of surveys also available, in epidemiological studies (discussed below) or other kinds of studies (sociological, psychological, economic, etc.). The national health surveys are repeated on a regular basis, which makes it easier to detect changes in population health.

The National Health Survey Act of 1956 authorized continuing survey of amount, distribution, and effects of illness and disability in the U.S. These include three types of surveys or data collection:

- Health interviews of people
- Clinical tests, measurements, and physical examinations
- Surveys of places where people receive medical care

Some examples of national health surveys include

- National Health Interview Survey (NHIS)
- National Health and Nutrition Examination Survey (NHANES)
- Behavioral Risk Factor Surveillance System (BRFSS)
- National Health Care Survey (NHCS)

The data from these national health surveys is now available on the Internet - you can see summaries of their findings, reports, graphs, statistics, or even (in some cases) the data sets themselves. Of note, some of these studies (like the Behavioral Risk Factor Surveillance System) have been paused, ended or substantially altered in 2025, so up-to-date data on youth risk behaviors may not be as easily available in the future.

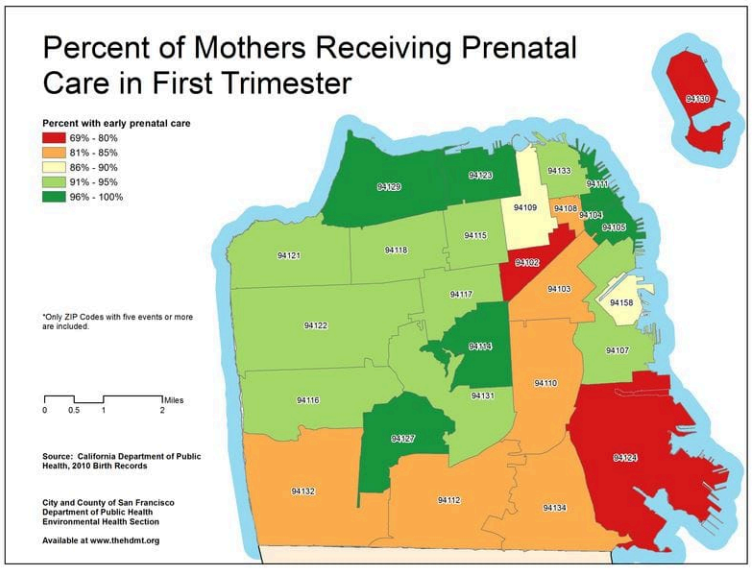


Figure 4.13.1: Often the data from these surveys is combined with mapping information to create maps -- like we saw in the Unnatural Causes video. Here's an example showing health survey data and a map of San Francisco. (Public domain; City and County of San Francisco, www.thehdmt.org)

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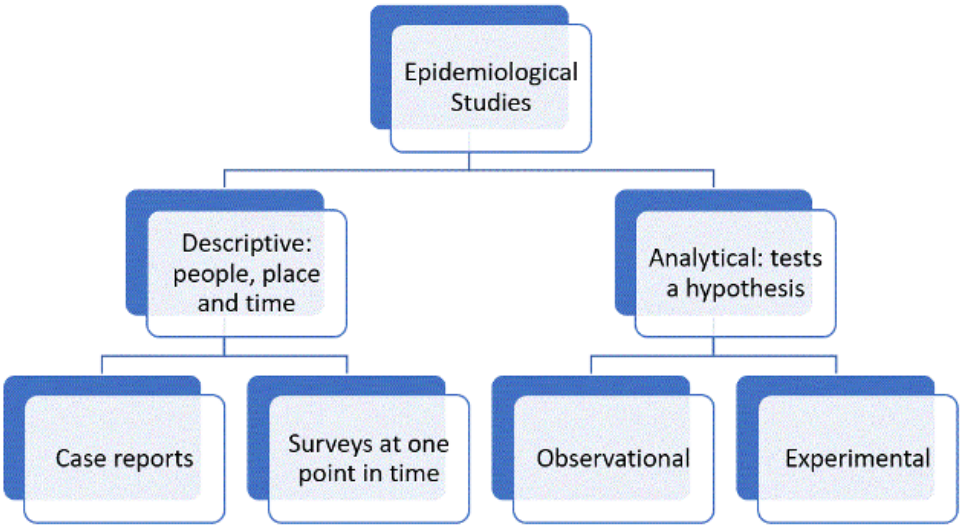
4.14: Epidemiological Studies

There are a variety of types of epidemiological studies, studies done in public health. These studies are more specific than the Census or the National Health Surveys. They are studies designed by researchers to answer a specific set of questions. When you are researching for your papers this semester, you will probably come across this type of study. For that reason -- and again, so you can be a *critical consumer of information* -- we are going to discuss some of the most common types of studies.

Now, this topic is big. You could spend a whole semester on it! And we won't. I just want you to understand some of the main differences among the types of studies.

The first big difference to understand is that between **descriptive** and **analytic** studies.

- Descriptive studies *describe* epidemics with respect to person, place, and time
- Analytic studies are aimed at *testing hypotheses*



A **descriptive study** tracks exactly what is happening or has happened in an epidemic or other health phenomenon. It doesn't test one situation against another, systematically. This information is still very useful, and researchers often compare data from one epidemic to data from another epidemic later, in an analytic study. In addition, as a descriptive study tracks data over the course of an outbreak, for example, it can give clues to what the causes of the outbreak are. If you look at the Scenario at the beginning of Chapter 3 in ICPH (p. 67) and again at the end, the Scenario Analysis and Response section (p. 98+), there is an exercise that allows you to take part in analyzing the data from a simple descriptive study, to understand an outbreak of food poisoning.

A descriptive study allows you to plot the data on a graph about who got sick, when and where. This creates an **epidemic curve** -- a graph of an epidemic. An epidemiologist would know that certain kinds of epidemic curves are typical of certain diseases. Your textbook ICPH gives some examples of these.

For example: As the Covid-19 pandemic first emerged in Wuhan, China, descriptive studies reported on who was getting sick and where. As the pandemic has continued, many other descriptive studies have described how the disease is affecting people -- how many, when, where, who, and with what impacts.

An **analytical study** is designed to test out ideas (hypotheses) about the relationships between a health problem and a certain cause or risk factor. Risk factors are things that are associated with greater probability of disease (or injury). For example, an analytical study could try to find out whether drinking sweetened soda (possible risk factor) is associated with a higher risk of diabetes (disease).

Analytical studies can be done in several different ways. One approach is **observational.** The researchers observe a group of people or a community over time and carefully collect data on what happens or on what people report has happened in the past. The researchers don't DO something other than observe.

When the researchers DO something to one group and compare the outcomes with another group, that is called an **experimental study**. In an experimental study, the groups are separated, either randomly or not. One group gets an exposure of some kind (say, they get an incentive to stop smoking) and the other group does not (no incentive). The researchers look at how the two groups compare.

- Randomization means one group that is randomly selected from the larger population of the study and they are given a treatment or a program that the other group does not receive.
- Placebos are often used when comparing two types of treatment -- one group gets a false kind of treatment (like sugar pills) while the other group gets the medicine, or other intervention.
- Sometimes it is not feasible or ethical to randomize, and instead a control group that is similar to the treatment group is used to compare outcomes.

Observational study example: Thousands of observational analytical studies about Covid-19 are underway. One study could follow the people who report "long Covid" -- symptoms that persist after the recovering from the infection -- to see what happens, tracking different variables they think might have an effect on "long Covid".

Experimental study example: Experimental studies were needed in order to assess whether the new vaccines work. People who volunteered for the clinical trials of vaccines were randomized in a double-blind study (neither they nor the doctors knew who was getting the real vaccine and who was getting a placebo), and both groups were followed to see who would get sick from Covid. The two groups were compared, to see how effective the vaccine was at preventing illness from the coronavirus.

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4.15: TYPES OF POPULATION STUDIES

In public health, we use studies to draw conclusions about where health intervention is needed most, and by doing so, we are able to allocate resources efficiently, implement preventive measures, and address health disparities with the goal of improving health outcomes. The three types of studies most used in public health are:

Population comparison studies: it examines differences in health outcomes between different populations; it compares health outcomes (i.e., disease rates, mortality) across different groups of populations (i.e., different geographic areas, ethnic groups, socioeconomic groups). The data used is often from existing sources like census data, vital statistics, or health surveys. The purpose is to identify health status between populations, potentially highlighting areas for targeted interventions or further investigation.

Observational studies: come in many forms, but the researcher is always recording and analyzing information on the subjects, never interfering in any way. The many types of observational studies are ecological, cross-sectional, case-control, cohort and prospective studies. These studies will be covered in more detail in the following pages.

Experimental studies: The researcher's primary goal is to determine whether a specific intervention causes a measurable outcome or not. Experimental studies are often referred to as clinical trials or randomized clinical trials.

In order to fully understand the studies we will be covering in the following pages, it is important to have an understanding of causation and association (also known as correlation):

Association (also known as correlation) is when studies can show a relationship between two or more variables being studied. Sometimes, this relationship is by coincidence or it could be a causation; however, to infer causation, more studies will need to be done to replicate it (Sudden Unexplained Death in Childhood Foundation, n.d.).

Causation is when studies can show one variable has a direct effect on another and this effect can be replicated. The most accepted studies that infer causation are the randomized clinical trials (Sudden Unexplained Death in Childhood Foundation, n.d.).

Reference

Sudden Unexplained Death in Childhood Foundation. (n.d.). May being a critical consumer of medical research: understanding association versus causation. https://sudc.org/being-a-critical-co...sus-causation/.

4.15.1: Observational Studies

4.15.2: Experimental Studies

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4.15.1: Observational Studies

Observational studies

The researcher always records information on the subjects, never interfering in any way. Below are types of observational studies most used in analyzing data to help aid in determine where the need for intervention to bring health to the population:

Ecological studies are very basic statistical analyses of incidence or prevalence of some disease, risk factor or protective factor *within a population or group*. These types of studies are helpful in identifying a potentially vulnerable population, and/or the need for more research for particular risk factors.

As an example, an ecological study might find that counties with more office workers also had higher rates of back pain. We couldn't conclude any causation from this type of study. There could be many reasons that office workers have higher rates of back pain. One, it could be that office work causes back pain. Two, it could be that people with back pain change careers so that they can work in an office. Three, it could be that office workers have better healthcare plans and therefore go to the doctor more often for musculoskeletal issues like back pain, and therefore it has been recorded more often than other types of workers. The point is that there could be many indirect ways these two things are associated, or there could be no association at all.

The example above goes illustrates that ecological studies are helpful at generating ideas for populations of interest or possible relationships between risks or protective factors and health outcomes. Causation is not proven.

Cross-sectional studies take a snapshot of a population at one point in time.

This can be imagined similarly to a cross-sectional view of a limb in anatomy; it's almost like you're taking a "slice" of the population and looking at their current prevalence of specific risks or protective factors and health outcomes. A lot of times we may want to do a cross-sectional study to identify a specific need in a population. For example, we might do a cross-sectional study to identify how many office workers in a particular area currently have low back pain. Perhaps we survey these workers or offer a screening at each office location. The difference between an ecological study and a cross-sectional study is that the ecological study looks at prevalence statistics in groups, whereas a cross-sectional study uses individual data, so in our example, we can be sure whether it's the office workers who have low back pain.

Cohort (also known as longitudinal studies) studies are typically much more expensive and time-consuming than other observational studies. The cohort study starts by identifying risk factors - or exposures - in a group (or cohort) of people and then follows this group over time to see what health outcomes occur. Thus, cohort studies are typically "*prospective*", which means tracking data forward in time with follow-up data collection on the same cohort. There are "retrospective" cohort studies, but these still begin with identifying exposures or risk factors from historical data in a particular group, and then following up with this group later on to determine outcomes (Celentano & Szklo, 2018).

Case-control (also known as retrospective) studies researchers observe existing groups (cases and controls) to identify potential associations between exposures and outcomes.

In this study it starts by identifying a group of people who have experienced a specific outcome, and then looking for specific exposures, health behaviors or other factors to try to determine the cause or causes. Looking backwards like this is termed "retrospective". Although we can perform other studies that are retrospective, case-control studies are always retrospective because they start with the outcome and work backwards.

Let's say for example we wanted to find out if smoking was a risk factor for lung cancer. For a case-control study, we would start by identifying cases - perhaps find a group of lung cancer patients at a hospital - and then ask them whether or not they had ever smoked. If we found that a large number of them had smoked, we might think that this indicates that smoking is a risk factor for lung cancer.

But wait - what if lung cancer rates were also high in non-smokers too? This identifies the need for the *control* part of the case-control study. We'll have to find similar people for our control group who *don't* have lung cancer, and ask them if they have ever smoked. If the number of smokers is much greater in the cancer group vs. the non-cancer group, then we might conclude there is an association between smoking and lung cancer after all.

Sometimes a single exposure of any amount is the risk factor, but other times the "devil is in the dose". If there is a *dose-response*

relationship between smoking and lung cancer, then those people who smoked more would have a higher risk of lung cancer. So perhaps instead of asking our cases and our controls whether or not they had ever smoked, we would ask them how many cigarettes they smoked per day, and for how many years. We would probably also want to know if they had quit smoking, and if so, how long ago.

There can be many issues that a researcher has to consider when performing a case-control study. We might have a selection bias for example. Perhaps the control group was selected from the same hospital and the controls were exposed to second-hand smoke or air pollution in that city or neighborhood. Perhaps the controls aren't similar enough to the cases in terms of age, sex, socioeconomic status, etc. If we were to compare a young control group with an older case group for example, the younger controls might just not have developed the disease *yet*. Thus, the selection of the controls can cause a bias in the research.

Another issue is that researchers must control for other variables that could influence the outcome, instead of the one being studied. For example, if a researcher wanted to find out if coffee consumption decreased the risk of obesity, they might find a case group of individuals with obesity, and a control group of individuals without obesity, and then ask them about coffee consumption. Maybe those people who drink coffee tend to also exercise or eat more pastries. If the researchers do not ask their study subjects about those habits, those could be affecting the person's body weight independent of the coffee consumption. Yet another pitfall is called *reverse causality*; when the variable is actually caused by the outcome. Taking the coffee/obesity example, it could be that people who have obesity often try to lose weight, and may do so by consuming coffee (since it is a mild stimulant). Therefore, it wouldn't be the coffee consumption that had an effect on obesity, but obesity that had an effect on coffee consumption.

Last but not least, all humans tend to have some *recall bias*. As case-control studies often depend on surveys or interviews, it's important to identify which participants might be inclined to remember or not remember certain details, or perhaps fudge some of what they report on a survey. For example, many people overestimate their height and underestimate their weight on self-reported data (Jain, 2010). If the study uses self-reported height and weight to determine obesity, then this data could be inaccurate. When someone has received a diagnosis, they are often "looking" for something in their past that caused it, which might make them more likely to remember specific things that happened to them, simply because they are "looking" through their memory for a cause (Lewallen, 1998).

Case-control studies are often considered simple and inexpensive to perform, since data can be gathered from interviews, surveys, or databases. They can help a researcher develop or confirm a suspicion, and if the study is designed well, they may even allow for an association to be inferred. However, typically they need to be replicated and/or bolstered by other types of studies (like randomized controlled trials) in order for a causal association to be confirmed. Many times, case-controlled studies may actually contradict each other, depending on the methods used and how well the researchers controlled for biases and other variables. It's important to review the methods used and keep in mind common biases and confounding factors when reading a case-control study article.

Reference

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Jain, R. B. (2010). Regression models to predict corrected weight, height and obesity prevalence from self-reported data: Data from BRFSS 1999–2007. *International Journal of Obesity*, *34*(11), 1655–1664. https://doi.org/10.1038/ijo.2010.80

Lewallen, S., & Courtright, P. (1998). Epidemiology in practice: case-control studies. Community eye health. vol. 11,28: 57-8. https://www.researchgate.net/publica...ontrol_Studies

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4.15.2: Experimental Studies

Experimental research

It includes interventions and randomized controlled trials or clinical trials. When researchers are testing whether or not a particular health program works or a particular drug is effective, they use these types of experimental studies. The hallmark of an experimental study is that the researchers are testing a certain metric before and after the intervention to determine whether or not their experimental protocol or drug caused a specific outcome. Studies like these often have three steps: a pre-test, the experimental protocol, and then a post-test.

Interventions are often done to test a drug, medical technique, or health program and see if it can lead to a positive health outcome. Let's take a common public health behavioral intervention like exercise, with a goal of improving a health outcome like reducing blood pressure. In this example, perhaps we wanted to find out if offering a free exercise program in a particular community would decrease blood pressure readings in participants. We would test the participants blood pressure before offering the exercise program, offer the exercise program for a number of weeks, and then test blood pressure again at the end of the program. Some of these types of intervention studies are done simply to see if the program is feasible for the community. If it's the very first time an intervention is implemented in a specific community, they might start with a smaller group to test for feasibility. This is called a *pilot study*. Some interventions and pilot studies have control groups as well. For our example, including a control group might require testing blood pressure in subjects in another neighborhood that did not have the exercise intervention. Control groups are a hallmark of well-conducted interventions because they compare the experiment to a similar situation without the experiment. How do researchers know that the outcome wouldn't have happened anyway without their experimental intervention? The control group provides that comparison.

Randomized controlled trials (known as RCTs) are a type of experimental study/intervention which is considered the highest level of research in determining cause and effect. This is for several reasons. First, by randomizing the selection of subjects, this removes selection bias and assumes that the subject pool (experimental group and control group) will be as similar to each other and the general population as possible. Second, RCTS have a control group, also known as the placebo group. Third, a controlled trial attempts to "control" the study for as many potentially confounding variables as possible. To some extent, this can be done after the fact via statistical calculations, but this can also sometimes be done in the study design.

For example, we were measuring weight loss with our exercise intervention. What else could cause weight loss in either our experimental or control subjects? If several of them went on a diet, or started taking weight-loss medications, or did extra exercise outside of the program, these factors could "confound" our results - i.e. their weight changes would be a result of these other things, not the exercise program itself. As the researchers, we would therefore have to take steps in designing the study in order to reduce these confounding factors (such as asking participants not to change their diet or requiring that subjects are not on weight-loss medication in order to be a part of the study). Additionally, many RCTs are blinded or double-blinded, where the participants and/or the researchers are unaware of which participants are in the experimental and control groups. This helps to eliminate researcher bias (as the researchers might unknowingly treat the experimental participants differently), and it also helps to account for the placebo effect. The placebo effect is a real - not imagined - phenomenon of thinking one is taking some sort of treatment for a disease, and actually experiencing a positive outcome (Harvard Health Publishing, 2021). Using a placebo for the control group allows for the possibility of positive psychological effects from receiving treatment to be experienced by both groups. Thus, any additional improvement experienced by the experimental group could be attributed to the treatment itself, not a placebo effect.

Reference

Harvard Health Publishing. (2021, December 1). *The power of the placebo effect*. Harvard Health. https://www.health.harvard.edu/menta...placebo-effect

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4.16: Causation

Let's take a moment to point out the difference between **an association or correlation** between two factors, and **causation.** We have said that a **risk factor** is something (a trait, a behavior, an exposure) that is associated with an increased probability of a disease or injury happening. While some risk factors are causes (for example, tobacco smoking is a risk factor for lung cancer AND tobacco causes lung cancer), many are not. For example, living in a rural area is a risk factor for car crashes -- but it isn't the cause of car crashes.

- **Correlation** means that the risk factor and the disease often appear together. It doesn't prove that one of them causes the other. There are at least three possibilities that could be true: if A and B occur together (correlation), then it may be that A leads to B, or B leads to A, or something else (let's call it C) leads to both A and B.
- **Causation** means that we have good evidence that A causes B. To establish causation of a disease, usually we need multiple studies over time that point in the same general direction. Randomized control trials are the "gold standard" for proving causation.

Optional video describing the difference between Correlation and Causation:



Some studies that ONLY show correlation get described in the press as showing causation, and not just in stories about health. I want you to think critically when you see the suggestion that A causes B.

A researcher by the name of Hill proposed a set of criteria for assessing causation. An association between a possible cause and a disease (or other health problem) doesn't have to meet every single one of Hill's criteria in order to be found to be truly causal. However, if the relationship is shown to meet most of Hill's criteria in most of the research studies that have been done, we can talk about causation with some confidence.

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These criteria are discussed in more detail on the next page on etiology and causation.

Keep in mind...

Sometimes a correlation is just random -- it doesn't mean anything. Take a look at these funny-but-true correlations. It is highly unlikely that any of them represent causation.

Of course, *some* unexpected correlations DO turn out to be causally related. New developments in science are often surprising. For example, there may be an association between lead in gasoline and rates of violence in the US -- it is being seriously considered by researchers of violence. We can use Hill's criteria to assess the strength of the argument for causation.

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4.17: Etiology and Contributory Cause

Etiology, is a term with roots in Greek that means the cause of disease. Within an evidence-based framework of public health, the concept of **contributory cause** is a specific type of etiology, which requires demonstrating causality beyond mere association through three key criteria (Riegelman & Kirkwood, 2025 pp 35-39):

1. In an individual level, the "cause" is associated with the "effect". For example, the "cause" = lung cancer and the "effect" = smokers, it would be required that people diagnosed with lung cancer tend to be smokers as compared with individuals without lung cancer.
2. In an individual level, the "cause" comes before the "effect". For example, the "cause" = not enough sleep and the "effect" = increase risk of obesity, it would be required that not enough sleep comes before the onset of obesity.
3. In an individual level, altering the "cause" also alters the "effect". For example, the "cause" = reduction of cigarette smoking and the "effect" = lung cancer, it would be required that reducing cigarette smoking also reduces the incidence of lung cancer.
4. In a community level, a group association of "cause" and "effect". For example, history shows that men started to smoke before women and the incidence of lung cancer in men increased years before women.

It is important to note that epidemiologists use certain studies to analyze the relationship between the "causes" and the "effects" to infer contributory cause. These studies are case-control studies, cohort studies, randomized controlled trials, population comparison or ecological studies. Let's look at how the studies help in determining the contributory cause:

1. Case-control studies are the most helpful in associating the first requirement; the cause is associated with an effect.
2. Cohort studies are the most helpful in associating the second requirement; the cause comes before the effect.
3. Randomized controlled trials are the most helpful in associating the third requirement; altering the cause also alters the effect.
4. Population comparison or ecological studies are the most helpful in comparing population incidence between cause and effect.

It is important to note that the above requirement for identifying contributory cause is the same as the one to establishing **efficacy.** Efficacy is the ability to produce the desired positive effect of an intervention.

There are times when it is not possible to have a concrete contributory cause, and in those cases, analysis of supportive evidence needs to take place to establish cause and effect. The most well-accepted criteria are:

- **Strength of the relationship:** this looks at how closely related the **risk factor** (what increases the likelihood of a negative outcome) is to the disease. To measure the strength of the relationship, it is necessary to calculate the **relative risk**, which is calculated by: probability of the disease for those with the risk factor/ probability of the disease for those "without" the risk factor. The larger the quotient (result of the division), the larger the relative risk.
- **Dose-response relationship:** this looks at whether quantity is a factor in developing the disease. For instance, considering the opioid crisis and knowing that prescription drugs could be a contributory cause, one can analyze to see if those that have developed opioid addiction disease through prescription drugs were more addicted due to the time they were on medication or the strength of the pain medication.
- **Consistency of the relationship:** this looks at whether different groups in different geographical areas produce similar results. Again, take the opioid crisis and addiction formed due to prescribed pain medication, would an analysis of the people afflicted in different geographic areas yield the same result?
- **Biological plausability:** this looks at explaining the disease based on accepted biological means. Looking at the opioid addiction, morphine derived drugs act upon the brain to change to produce drug liking, tolerance, dependence, and addiction (Korsten & George, 2002).
- **Specificity**: this considers how closely tied a specific exposure is to a specific disease. For example, if excessive exposure to sunlight was observed as a factor in many different illnesses, not just skin cancer, it would be harder to draw a causal link.
- **Temporality**: this one seems almost obvious -- does the exposure happen BEFORE the disease develops? If the exposure happens after the disease develops, it cannot be a cause of the disease.

Much of the above information was obtained from Riegelman & Kirkwood, 2025 pp35-39.

Reference:

Korsten, T., George, T. (2002). The neurobiology of the opioid dependence: implications for treatment. Science Practice Perspect July 1(1):13–20. https://pmc.ncbi.nlm.nih.gov/articles/PMC2851054/

Riegelman, R., & Kirkwood, B. (2025). Public Health 101 Improving Community Health (4th ed). Jones & Bartlett Learning LLC.

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4.18: Risk Factors and Protective Factors

The term "**Risk Factor**" is very specific in epidemiology -- much more specific that what we mean when we talk about risk in ordinary English. I want to make sure that everyone understands what a "risk factor" is, so even though you have seen this term already, it's worth a quick review. And while we're at it, we might as well also define a risk factor's opposite -- a **protective factor** (or resiliency factor).



A **risk factor** is something *associated* with a higher chance (higher probability) of developing a certain disease or injury, or of adopting a certain health behavior. It may or may not be an actual cause of that disease or injury. Here are some examples:

- Smoking tobacco is a risk factor for lung cancer. (In this case, the risk factor, tobacco, is also an proven cause of the disease, cancer.)
- Young age is a risk factor for motorcycle crashes. (One's age doesn't cause the crash -- but maybe something associated with younger age does, like being more prone to showing off, or being less experienced, or driving a poorer-quality motorcycle.)
- Having friends who vape is a risk factor for starting to vape. (This risk factor is pretty obvious -- but it does suggest that addressing the norms within a peer group might be a good prevention strategy.)

A **protective factor** (also called a resiliency factor sometimes) is something associated with a higher chance of avoiding disease, injury or some other bad outcome. Again, it may or may not be an actual cause of that outcome.

- Having a mentor is a protective factor that protects against school drop-out.
- Living in an urban (versus a rural) setting is associated with a lower chance of suicide.

Public health programs often use risk factors to identify the populations that need the most focus and resources. They are also used in the design of programs (or policies), as we generally try to reduce exposure to risk factors and increase protective factors.

Risk factors are imperfect predictors of disease.

- Some people with the disease won't have the risk factors.
- Some people with the risk factors won't have the disease.
- But still, those with the risk factors are more likely to develop the disease than people who do not have those risk factors.

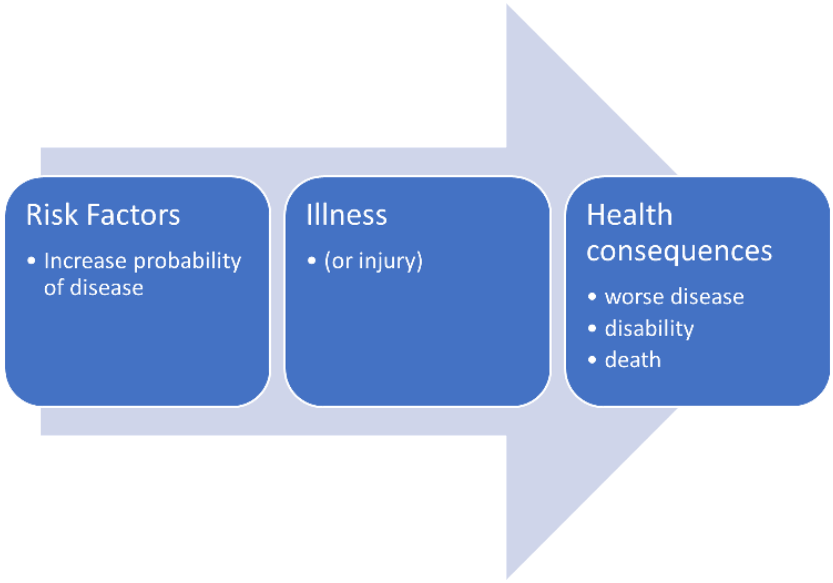
Don't mix up risk factors and health consequences

In ordinary English, we might say something like, "Losing your sight is one risk of diabetes." But losing one's sight is not a "**risk factor**" for diabetes! Why? A risk factor is something that correlates with the onset of a disease (or injury). Losing one's sight is a consequence of diabetes. People who are blind are not at greater risk of developing diabetes in the first place -- rather, the

disease can cause poor vision.

Think about **the timeline of development of a disease** (or injury). The risk factor must be present either before the disease (or injury) starts, or at the same time. If it only shows up AFTER the disease or injury starts, then it is probably a health consequence (or maybe a coincidence), not a risk factor.

> This is one of the most common mistakes students make in HLTH 54. **Make sure you understand what a RISK FACTOR is!**Try using the term in ordinary conversation, correctly, to get more familiar with this public health terminology.



Examples:

- Road is poorly lit at night (risk factor) leads to car crash (injury). The road must be dark BEFORE or WHILE the car goes on it, in order to influence the crash. Not after the crash.
- Person who gets cancer loses their hair (health consequence). But being bald is not a risk factor for cancer!

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4.19: Health Information

Most of us, when researching a health problem that affects our family or a public health topic for a paper aren't going to conduct a research experiment or gather primary data. We are going to rely on **published information.** So it's important to know where you can get health information and how to decide if you can trust the information you find.

We'll look at how to evaluate the reliability of health information you find on the Internet and how to access the library online resources. For those of you who are experienced in research, this may be review - while for others, it may be new information.

Getting started researching a health topic

One good place to start: Many college libraries offer a research guide for public health or health education. For example, check out this Health Education Research Guide from the CCSF Library website.

Libraries also are staffed by librarians! Stopping by a library, phoning, or chatting online with a reference librarian about your topic can save you a lot of time, as librarians can guide you in your search for information.

Evaluating Health Information on the Internet

As recent controversies have shown, bad information on the Internet can cause serious problems. When there is a lot of money to be made and/or strong ideological positions, it can be quite difficult to find reliable information. Web sites that look legitimate sometimes aren't.

How do you know what information to trust? Use the CRAAP test!

Check for reliability: The CRAAP Test

Our library recommends the "CRAAP Test" to see whether a website is a reliable source or not. It's very useful!

C=Currency: How current is the information? And how important is it, that the information be current? If you are looking up a list of state capitals, well, that hasn't changed in a long while -- a website from 10 years ago will probably be fine. If you are looking for information on the effectiveness of masks at preventing the spread of Covid-19, the information from a year ago is likely to be out of date already. In general, I encourage you to use sources that are no more than 6 years old, unless the source is something of a "classic" or one that has had a large influence.

R=Relevance. Is this information relevant to what you are researching? Is it at the right level (not too basic, not too advanced)? Does it answer your main questions? How does it relate to the other sources you have read?

A=Authority. Who wrote this? Do they know what they are talking about? Are they part of an institution you can trust? Is the work peer-reviewed? This is often the most important criteria to consider, in my opinion.

A=Accuracy. How accurate is the information? Does the author show how they reached their conclusions? Do they show their evidence? Is the information presented in a way that shows a bias, or is it closer to objective?

P=Purpose. What is the purpose or motivation of the person publishing this? Is it to sell a product? To sell an idea or win an argument? How does it compare to other sources you have reviewed?

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4.20: PUBLIC HEALTH AND THE FIGHT AGAINST MISINFORMATION

One of the essential public health services is to inform, educate, and empower communities and individuals about their own health. But what should be done if other sources are putting out conflicting and potentially harmful information? Being barraged with confusing and conflicting information can cause people to lose trust in public health agencies, and they may resist complying with public health guidance or policies. To add to the noise, some individuals use conspiracies and purposeful disinformation for their own gain - to sell books and supplements, or to increase their followers on social media and podcasts for ad revenue. Public health now has a new epidemic to address: the “infodemic” of misinformation.

It is important to define the types of incorrect information shared by whether or not there is a clear intention to mislead the public. The term “misinformation” is an umbrella term that includes errors in the interpretation of data, research, or messaging, or perhaps information that was considered accurate and true at one point in time, but which has since been discovered to be false. Misinformation may be believed and shared naively. Disinformation on the other hand is a type of misinformation which is shared intentionally and with an ulterior motive - which could be for social, political or financial gain. However, it is difficult and sometimes dangerous to assume the intentions of whomever is sharing. Unless the intentions of the sharer are obvious and nefarious, we should use the term misinformation to give them the benefit of the doubt (Swire-Thompson & Lazer, 2020).

Historically, erroneous health messaging ranged from the classic “snake-oil salesman”of the 19th century, to the invention of Coca-Cola as a tonic for a variety of health complaints (the original version had cocaine in it), to doctors promoting the health “benefits” of smoking in cigarette advertisements. In 1998, a well known “infodemic” ensued after two scientific publications in the Lancet proposed a link between the measles, mumps, and rubella (MMR) vaccine and Autism Spectrum Disorder (ASD). The papers were subsequently critiqued and found to be faulty, the Lancet retracted them (albeit nearly a decade later), and the author - Dr. Andrew Wakefield - was stripped of his medical license - although he continued his anti-vaccine messaging on any platforms that would host him. A plethora of different studies were subsequently done that refuted the link between vaccines and ASD. Yet, this misinformation began to spread across the globe and was endorsed by celebrities, causing parents to delay or decide not to vaccinate their children at all. And eventually, this had an impact on population health outcomes. Even though measles had been declared eliminated in the U.S. in the year 2000, vaccine hesitancy led to several measles outbreaks over the next two decades (DeStefano & Shimabukuro, 2019).

More recently, misinformation and conspiracy theories about the SARS-CoV-2 virus, the COVID-19 vaccine and other public health measures such as lockdowns and masking were virulently spread; primarily online via social media, but occasionally also picked up in mainstream media like TV news channels and news publications as well. The original conspiracy theories were most often associated with extreme political ideology (at both ends of the spectrum). Yet as they were picked up by celebrities, podcasters, and content creators, they became more mainstream in the public consciousness. Many of these theories were overtly or covertly racist, and beyond expressing a general distrust of science and public health, they inferred that public health measures were the result of corrupt political agents (Walter et al., 2023). With the rapidity of internet and social media communication misinformation has the opportunity to change population behaviors, eventually also muddying political identity and health belief norms (Seymour et al., 2015).

The COVID-19 pandemic was a short term study in how misinformation and politicization of health beliefs can have a significant effect on population behaviors. The novelty of the virus and shifting guidance from government health agencies did not bolster public confidence in official messaging, which created a prime environment for conspiracy theories to grow. Combined with generalized anxiety about the virus itself, it’s no wonder that there was a significant loss of trust in public health agencies and more broadly, in science as well. Combined, misinformation and lack of trust in public health agencies had a direct effect on individual behaviors. Violent confrontations occurred around masking requirements (Hutchinson, 2020), and later vaccine requirements at workplaces became equally controversial (Bardosh et al., 2022).

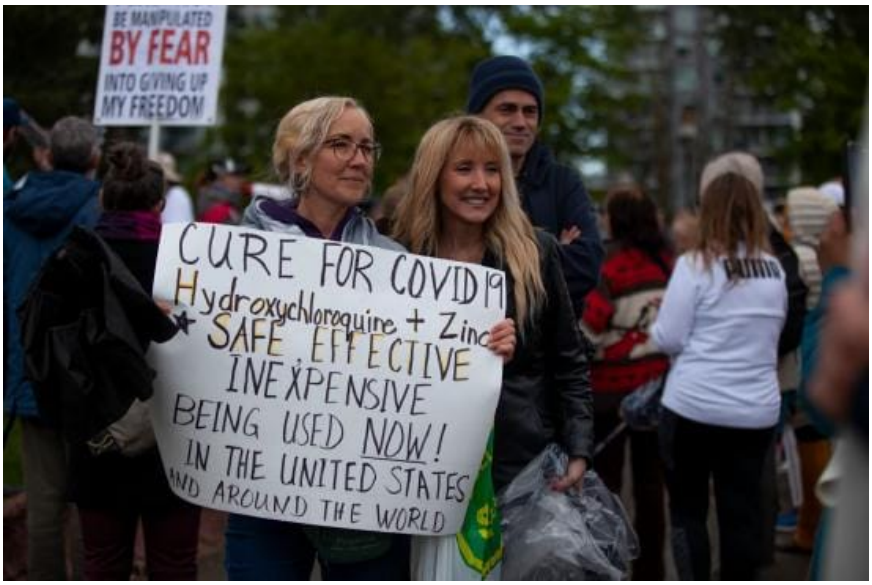


Figure 4.20.1: COVID-19 Anti-Lockdown Protest in Vancouver, May 3rd 2020. Photo credit: GoToVan from Vancouver, Canada. (Copyright; CC BY 2.0, via Wikimedia Commons.)

After the COVID-19 “infodemic” surrounding public health measures and vaccine myths spread rapidly, government agencies have recognized misinformation as a significant public health concern. In fact, in 2021 the U.S. Surgeon General released a report summarizing the threat of health misinformation and a call to action for individuals and organizations, stating: “Health misinformation is a serious threat to public health. It can cause confusion, sow mistrust, harm people’s health, and undermine public health efforts. Limiting the spread of health misinformation is a moral and civic imperative that will require a whole-of-society effort” (Murthy, 2021). In April of 2022, the CDC launched an initiative to improve their communication practices, for example, streamlining communications to the press and improving their website.

The CDC's practices around health communications have again changed substantially in 2025, with a lot of health information removed from the CDC website and restrictions placed on CDC publications, as described in press reports from NPR and others.

4.20.1: Internet, Social Media, and the Age of Algorithms

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4.20.1: Internet, Social Media, and the Age of Algorithms

As we might already assume, most people get health information via internet sources in the 21st Century. When faced with a new symptom or health decision, the first action is often a simple internet search. Which websites top the results list may be determined by advertising dollars, or by search engine algorithms that tailor results to the person's past search history. Further direct-to-consumer advertising by medical and pharmaceutical companies can be a result of a search, viewing a website or post on social media. These algorithms and targeted ads may affect our health decisions far more than we realize (Stark & Fins, 2013).

Algorithms also affect our social media experience. Although a user may initially choose whom to follow, social media platforms will typically recommend similar pages based on that individual's use data. User-generated content can be quickly shared with a broad audience, often without the identification of the original source or any verification of the information. And social media platforms are often used to spread an ideology or sell products. Take, for example, the anti-vaccine sentiment after the COVID-19 vaccine rollout. It was discovered that a majority of the anti-vaccine misinformation posts on social media sites Facebook and Twitter were created by the same 12 individuals (many of whom had been sharing health disinformation for years already) (Bardosh et al., 2022). When these posts garner equal - if not more - attention in the media than posts from reputable sources, misinformation spreads farther and faster than correct information. Similar to the analogy of attempting to put out a million small fires at once, it can be difficult to combat this type of misinformation with well-researched rebuttals in a timely fashion. As a result, it is still left up to the viewer to do the due diligence of validating the information presented to them, which is often a more lengthy task than most people are willing to take on.

As humans, we already struggle with a variety of cognitive biases that cloud our decision-making. Availability bias (more of "it" must make it true), confirmation bias (searching for evidence to support what we already believe), and overconfidence bias (feeling we know more than we do), are all exacerbated by the social media and search engine algorithms (Stark & Fins, 2013). Our "engagement" with certain posts is tracked, and we are subsequently fed similar posts - thus cementing our own personal "reality bubble". With the advent of readily available artificial intelligence the access to information is potentially limitless, but the quality of that information remains malleable by both commercial interests and machine learning algorithms.



Figure 4.20.1.1: (Copyright; Photo by Sara Kurfeß on Unsplash)

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4.21: Is Science Even Trustworthy?

As information becomes more and more accessible, it can also become more confusing. It almost seems that people can use the phrase “studies say ___” and then insert whatever factoid they want to be true. This line works in sales pitches for everything from mattresses to coffee, online arguments for “*which diet is best*”, and of course starting new drama at the family gathering over the effectiveness of vaccines. To be fair, if a person has access to Google they may be able to dig up a random research article that “proves” their point, no matter what that point is. But do we really know if it is quality research? Or if it's being interpreted correctly? This is where a lot of health “influencers” - and even researchers themselves - can end up spreading misinformation, even with good intentions.

First, let’s be clear that “the science” - or what we should more accurately call scientific consensus - *doe*s change over time, and it *should*. Scientific consensus is merely what scientists and researchers can mostly agree on, based on the available evidence, at a given point in time. As new research is performed, or new methods of investigation become available, and we learn more about ourselves and the world, the scientific consensus should be updated. A hallmark of the scientific method is that it recognizes the limitations of research and promotes an open mind to learning and testing new discoveries. “Good science” is constantly testing and trying to prove ourselves wrong in as many ways possible before we can consider our conclusions “correct”.

Two ways to ensure that a particular research study is done well are to make sure that the research methods are **valid** and **reliable.** Validity refers to how we are measuring outcomes. Does the testing method actually measure what it is supposed to? Another way to think of validity is the accuracy of an arrow hitting a target. If the test hits the “bullseye” of the target (thing we are trying to measure) consistently, then it is accurate or valid. Most testing methods have to be validated or compared to a “gold standard” - which is the best measurement we have at the time. For example, if we are using the 1.5 mile run to estimate a person’s cardiorespiratory fitness level (CRF), it should have been validated against a VO2max test - which is the gold standard for measuring CRF. All of our study participants who score high on the 1.5 mile run would presumably also have scored high on a VO2max test, and there needs to be ample evidence that the 1.5 mile run score is based on the subject’s ability to perform cardio exercise.

Reliability simply means that the test will give us the same results each time it is used. There are two kinds of reliability: intertester and intratester reliability. *Inter*-tester means between testers, so for example, if we had two coaches at the finish line with the stopwatch measuring the 1.5 mile run, they would get the same results for the same subject. If the test is too subjective or open to interpretation by the tester, we are going to get different scores from different testers, and therefore the test is unreliable in the way it is performed. We should also be able to get the same score by the same tester, if the test is repeated. This is called *intra*-tester reliability. If the same researcher gets a significantly different outcome each time they repeat the test on a subject, then the test itself is not reliable and shouldn’t be used. To use our previous analogy with arrows and the bullseye on a target, a reliable test is one that will cluster all of the arrows closely around the same area. See Figure $4.21.1$ for a visual representation of this analogy.

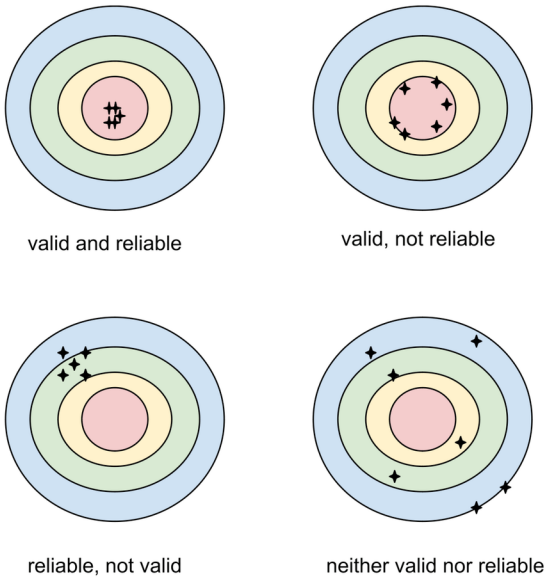


Figure 4.21.1: Validity and Reliability Analogy.

Another requirement for good research lies in the interpretation of the research by the researchers themselves. Researchers are human just like everyone else, and the conclusions they draw from their own studies may have errors. The goal of the **peer-review** process is to try to identify errors and weaknesses in the study methods or in the interpretation of the results and correct those before the study is published. This is one reason why research articles often don't get published for months - or even years after the research study was completed. And even though we have other scientists - the peers of the researchers, who are experts in the area being studied - reviewing their articles before publication, sometimes mistakes still slip through or the conclusions are debated. Scientists often have lengthy debates over the interpretation of research results. Over time, these studies may be repeated, and new studies will be published perhaps providing new insights. Once a lot of research has been done that supports a particular conclusion, often scientists will get together and develop a consensus. This consensus is simply an agreement between the folks who know the most on a particular topic, that they are confident in their conclusions. Sometimes a consensus isn't reached, because there are too many research studies with conflicting evidence, or the evidence is *equivocal* - which means it is open to several different interpretations.

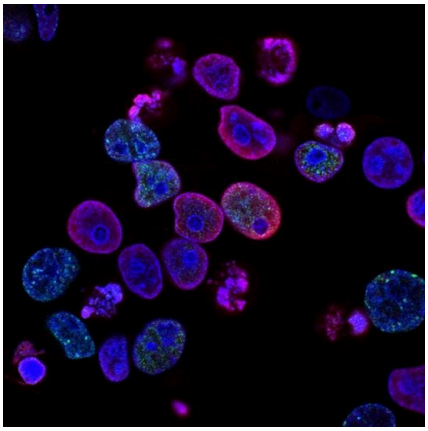


Figure 4.21.2: Human colorectal cancer cells treated with a topoisomerase inhibitor and an inhibitor of the protein kinase ATR (ataxia telangiectasia and Rad3 related), a drug combination under study as a cancer therapy. Cell nuclei are stained blue; the chromosomal protein histone gamma-H2AX marks DNA damage in red and foci of DNA replication in green. , 2014. (Copyright; Created by Yves Pommier, Rozenn Josseauthor via National Cancer Institute on Unsplash)

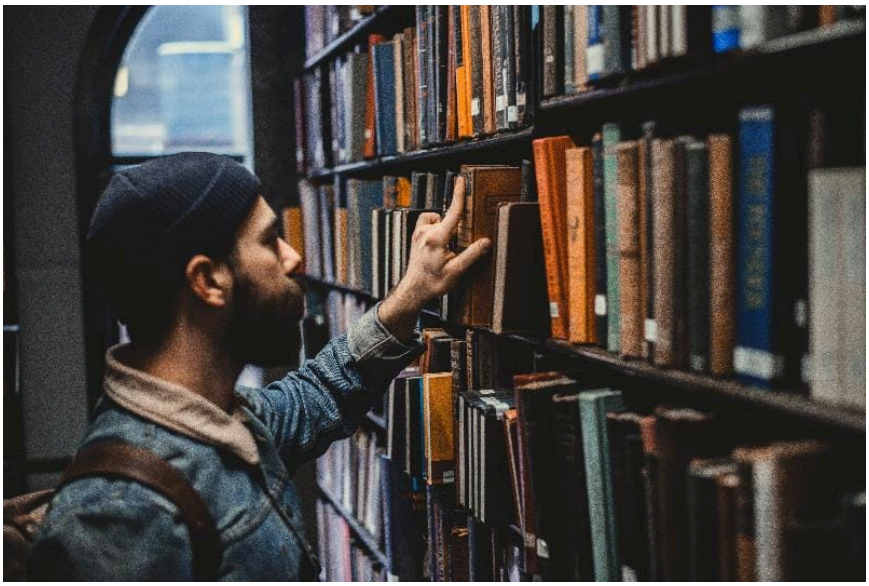
A historical problem with high-quality research is that it is often behind a paywall. The most reputable scientific journals often require expensive annual professional membership fees from the readers. Sometimes these fees can be overcome during enrollment in higher education, through the college or university's library access to scholarly journals - but then the college or university is footing the bill. Once a student graduates, they no longer have access to these library databases and are forced to pay professional fees in order to have access to a particular journal's current or back issues. Researchers also typically have to pay a fee to submit their research for publication, and peer-reviewers scrutinize their work without compensation. All of these practices

amount to an inequitable “gatekeeping” of information to the professional communities or academic institutions who can afford membership and researchers who can afford publication. In response to this inequity, many publications are becoming *open-access*, or freely available online. While this is a positive response, there are still challenges faced by open-access publishers. In an effort to collect revenue, some have reduced (or entirely eliminated) their peer-review process and require researchers to pay even more exorbitant fees for publication. This calls into question the scientific rigor of these “predatory” publications, even though they are freely accessible. Not all open-access publications are this untrustworthy, but sometimes it is hard for the average internet-surfer to tell the difference. Academics, librarians, and universities across the globe are calling for a revolution of sorts to make high-quality, peer-reviewed scientific research publications free to the public (Resnick & Belluz, 2019).

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4.22: The Value of Deeper Research



In this day and age, when you can look up anything on the Internet and watch a quick video or skim an overview of the topic, the value of researching a question more deeply may get lost.

Some time ago, I read an interview with someone who had researched for years, maybe decades, to write his book. The author, Ricky Jay, said, "It's really strange that with a book like this, you can now look up nearly every character on Wikipedia and find a page about them. And people think this knowledge - that you've worked so hard to obtain - is obtainable in 10 seconds, and that's all there is to it. There are enormous dangers in thinking the world online is the world as it exists, that what you get from your one stroke on the Internet is all there is to know."

That really struck me! I really value the **curiosity** that leads us to read a little bit about a lot of things. I also value the curiosity can lead you into taking a **deep dive into a single topic**. While you are in college, and always, I encourage you to cultivate that curiosity, to read both widely and deeply on subjects that interest you.

There is probably nothing that you can get out of a college education more important than **skill and practice in following your curiosity**.

Do's and Don'ts:

- Don't rely ONLY on Google for your research. Use the library more often.
- Do use the research databases available through the library to get reliable, peer-reviewed sources, including ones that are a little challenging to read.
- Don't use a fact sheet or brochure (or a webpage that is like a fact sheet or a brochure) as a source on a research paper. It doesn't give enough information. It's helpful to read fact sheets and brochures, but use them as a launch pad to find MORE information.
- Do explore information that interests you and choose topics you have an opinion about. Share that opinion. Test that opinion against the research you find. However, don't ONLY search for information to support your point of view. Actively seek out competing points of view and reliable research that can help you understand a problem or a health issue in a more rounded way. Your arguments will be better supported (substantiated) if you know more about your subject. (And sometimes, with more information your opinion might evolve!)
- Do explore the health research available to you on a Library website about a topic that you care about. Waste a little time reading about something that interests you. See if you can access a variety of sources examining the issue. Look for bias, look for quality, look for recency, look for the qualifications of the author, ask yourself questions that take a while to answer.
- DO have fun with it!

- Do honest work -- avoiding plagiarism by citing your sources, avoiding the temptation to cut and paste, and stating your own analysis and summary of topics you have read about. (Many college libraries offer library workshops to learn how to avoid plagiarism -- like the Citation Champion workshop offered by the CCSF library.)

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4.23: Documentary- Invisible Shield, episode 2

In Chapter 2, we viewed the first episode of the 2024 documentary about public health, *The Invisible Shield*, titled "The Old Playbook." I now invite you to view the second episode, "Follow the Data" -- a good fit with this chapter's focus on the types, sources, and uses of data in public health.

You will see concepts like vital statistics, social determinants of health, surveillance systems to detect and respond to disease, and more, that you have read about already in this book. The information about epidemiology and uses of data is contextualized with historical examples-- remember John Snow and the cholera epidemic in London, from Chapter 1? -- and the early years of the covid pandemic. You will notice a specific examination of gaps in data collected about Native American populations, for example, as well as other challenges in getting accurate data about an emerging (and often confusing) health threat. The importance of public trust to public health is also emphasized, a topic that brings to mind concerns about the privacy of health data as well as the reliability of public health advice.

As you view the episode below, please consider the following questions:

1. How would you explain the importance of data to public health to someone who didn't know anything about it?
2. Early in the video, journalist Steven Johnson states "Collecting data and analyzing and making sense of it and disseminating it has probably saved as many lives as the vaccines and the antibiotics." How does data collection and analysis save lives?
3. How do social conditions affect health? Discuss in terms of the cholera outbreaks in London in the mid-1800's and also in terms of the covid pandemic in this decade.
4. Data collection -- such as vital statistics, hospital records, and testing results -- play a key role in public health. Can you discuss examples of how data collection and analysis directly shaped public health actions?
5. Consider this quote from the video: "That's what makes public health so powerful, that it's not just about imploring individuals to do the right thing for their health, but putting in place structures that mean that you get to be healthy without making a personal decision." Can you give more examples of how public health puts in place structures (whether physical improvements or in terms of public policy) that improve health?
6. The covid pandemic both heightened and highlighted tensions between personal responsibility (and choice) and public responsibility for health. What are some of the arguments on each side of this tension? What possibilities do you see for increasing understanding and cooperation among those who hold differing views?
7. In many ways, we are living right now in the world that covid built -- how do you see the pandemic and the public health measures put into place during the pandemic influencing public policy today (at the local or national level)?

Follow the Data - episode 2 of The Invisible Shield

Interactive Content

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4.24: Additional Resources

Every chapter of this book ends with a list of "additional resources" -- a few additional (optional) resources related to the content in this chapter.

Recent changes to the collection of health data, as reported by CBS in April 2025:

YouTube Video

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this YouTube Video online

Crash Course Public Health episode 6: Intro to Epidemiology (this video ties in to the information in this chapter and the next one, too)

YouTube Video

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4.25: References (additional references esp. for pages by Erin Calderone)

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5: THE PREVENTION AND CONTROL OF DISEASES

5.1: Learning Outcomes

5.2: The Public Health Approach

5.3: Classification of Diseases

5.4: Genetic Diseases

5.5: Communicable Diseases

5.6: Types of Infectious Agents

5.7: The Chain of Infection

5.8: Modes of Transmission

5.9: Susceptible Hosts and Population Immunity

5.10: How do we Eradicate Infectious Diseases?

5.10.1: Smallpox and Polio

5.10.2: Measles, Mumps, and Rubella

5.11: Emerging and Re-emerging Infectious Diseases

5.11.1: HIV/AIDS

5.11.2: Other Sexually Transmitted Infections (STIs)

5.11.3: Viral Hepatitis

5.11.4: Influenza Viruses

5.11.5: Coronaviruses- MERS, SARS, and COVID-19

5.11.6: Monkeypox (Mpox)

5.12: Noncommunicable Diseases

5.13: Multi-Causation Models of Disease

5.14: The Multi-Causation Model and the Ecological Model

5.15: Prioritizing Prevention and Control Efforts

5.16: Prevention, Intervention, Control, and Eradication of Diseases

5.17: Levels of Prevention

5.18: Prevention of Communicable Diseases

5.19: Vaccination and how rates are changing in California

5.20: Examples of Prevention of Noncommunicable Diseases using the 3 levels of prevention

5.21: Common Noncommunicable Diseases - An Overview for Prevention

5.21.1: Cardiovascular Diseases (CVD)

5.21.1.1: Current Rates in the U.S.

5.21.1.2: Risk Factors/Protective Factors

5.21.1.3: Public Health Response

5.21.2: Diabetes

5.21.2.1: Current Rates in the U.S.

5.21.2.2: Risk Factors/Protective Factors
5.21.2.3: Public Health Response

5.21.3: Cancers
5.21.3.1: Current Rates in the U.S.
5.21.3.2: Risk Factors/Protective Factors
5.21.3.3: Public Health Response

5.21.4: Chronic Lower Respiratory Diseases
5.21.4.1: Current Rates in the U.S.
5.21.4.2: Risk Factors/Protective Factors
5.21.4.3: Public Health Response

5.22: Additional Resources
5.23: Additional References - if not cited on page itself

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5.1: Learning Outcomes

By the end of this module, students should be able to



1. Describe the four steps of the "public health approach," and the role of epidemiology in the first two steps (in particular).
2. Explain the differences between communicable (infectious) and noncommunicable (noninfectious) diseases, and between acute and chronic diseases, and provide examples of each.
3. Explain the communicable disease model (also called the epidemiological triangle or the epidemiological triad), including the following terms: host, agent, environment, vector.
4. Compare the multicausal model (figure 4.5) and the ecological model (or social-ecological model), and discuss how they both help explainthe development of noncommunicable diseases that have multiple causes or contributing factors.
5. Explain the "chain of infection" model and use it to discuss how a specific communicable disease is transmitted.
6. Explain the "levels of prevention," primary, secondary and tertiary prevention of disease, and provide examples of each. Discuss how the "levels of prevention" model relates to the "upstream" focus of public health.
7. List and discuss at least three criteria that communities might use to prioritize their health problems when it comes to allocating prevention and control resources.
8. Identify the leading causes of death.
9. Discuss measures for preventing and controlling the spread of communicable (infectious) diseases in a community.
10. Discuss measures for preventing and controlling the spread of noncommunicable (noninfectious) diseases in a community.
11. Define health screenings (a common secondary prevention measure) and discuss their importance.
12. Outline a chronic, noncommunicable disease control program that includes primary, secondary and tertiary disease prevention components.
13. Discuss a current outbreak of communicable disease and the public health responses to it.

The following Table shows how I would group these learning outcomes or goals for this Module -- I find them easier to remember this way:

Clustering of learning outcomes for this Module

Fundamentals	**Communicable Disease**	**Noncommunicable Disease**	**Prevention & Control Measures**
Public health approach	Epidemiological triangle	Multicausal model	Prioritization

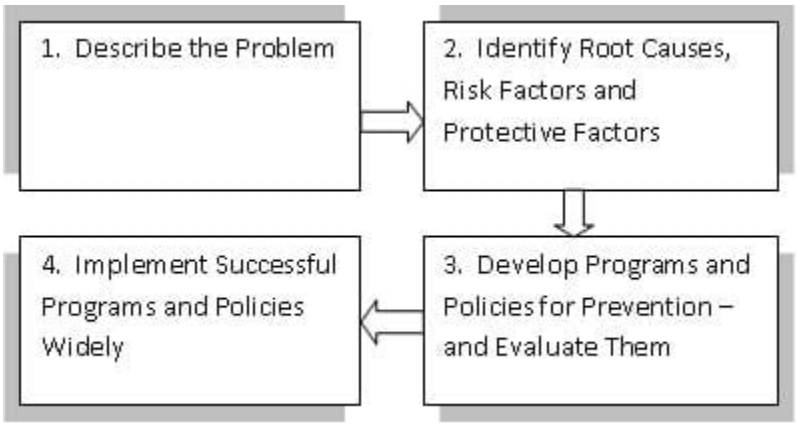
Definitions	Chain of infection	Ecological model	Levels of prevention (primary, secondary, tertiary)
Leading causes of death			Examples: --communicable disease prevention & control --noncommunicable disease prevention & control

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5.2: The Public Health Approach

Before we get into the specifics of preventing and controlling disease, let's take a step back and look at how public health frames a problem and then goes about solving it. This is often called "the public health approach."

There are four steps to the public health approach.



The first step is to describe the problem.

- Epidemiology is used to describe whom a health problem affects, how much of the disease or injury is occurring, whether it is changing over time or in location, and so on. It's not just defining the disease itself -- it's describing its impact in the population using health statistics.
- This step is also called "**surveillance**," which means monitoring and measuring a disease or injury in the population. (You can see this is a different meaning than"surveillance" by police! Nevertheless, in both cases, surveillance involves watching carefully and gathering evidence.) The previous chapter discussed how epidemiologists find and use **data** to describe health problems (for example, rates of disease).

The second step is to identify the root causes, risk factors or protective factors associated with the problem.

- The public health principle of **prevention** ("upstream") comes into play here. You can't prevent a problem if you don't know what causes it, or at least what factors are associated with a greater likelihood of the problem occurring (risk factors). If you can identify **risk factors**, then you can begin to reduce them, focusing your prevention efforts.
- If you find there are **protective factors** that create greater resiliency or help protect people from developing the illness or injury, then, likewise, you can work to enhance those protective factors.
- In this chapter, you will learn more about how epidemiologists analyze the risk factors and the causes of disease.

The third step of the public health approach is to develop and evaluate programs and policies that could prevent the problem.

- Sometimes the actual *cause* of the problem can be eliminated – such as removing asbestos from a building, or eliminating transfats from foods. Othertimes, we reduce the *risk factors* or increase the *protective factors*.
- Often these are **local programs** or **smaller-scale programs** that have to be tried out and evaluated to see if they work.
- Programs must be **evaluated** to see what works, for whom, under what conditions. If a program works in one place, it can be tried in another, with adjustments for the local community.
- Public health is population-based, so we look for program effects across a ***population*** - not just individual or anecdotal successes. Even a small impact across a large population can mean a lot.

The fourth step is to take what works and implement it more widely.

- We can do this by **passing policies or laws** that reach more communities.
- Or by **setting standards** that all programs must meet.

- Or by **funding successful programs statewide or nationwide**.
- Or by **spreading successful ideas** through grassroots movements that share strategies and stories -- when that happens, soon similar programs or campaigns are sprouting up in different places.
- Remember the principle that public health is concerned about social justice, and the social determinants of health? If we can ensure that *all people* have protection from the causes of disease, or access to the programs and policies that reduce their risk, then we will have greater *equity* in health.

Risk Factors and Protective Factors

Risk Factor = A condition, behavior, characteristic or situation that contributes to, occurs with, or increases the chance of a particular disease or injury, for example, smoking tobacco.

Protective Factor = A characteristic, condition, situation or behavior, such as physical activity, that is associated with greater health, or less chance of disease or injury.

You will find some version of the public health approach in many publications. This (optional) link provides an example of how this Public Health Approach is used by the World Health Organization in violence prevention work.

Reflection to check your understanding:

Can you think of an example of a successful program or policy that started in one location, and now is used in many places? How do you think this came about?

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5.3: Classification of Diseases

Classification of Diseases and Health Problems

Often diseases are **classified by organ or organ system** -- for example, diseases of the kidneys, or diseases of the heart.

Another method is to **classify by the thing that causes the illness or injury**, such as viral diseases, parasitic diseases, or unintentional injuries.

Sometimes diseases are **classified by their mode of transmission** -- waterborne infections, for example, or diseases carried by mosquitoes.

One of the most important distinctions (or classifications) is between diseases that are infectious (**communicable**) and those that are not infectious (**noncommunicable**).

- **Communicable (infectious) disease is** an illness caused by some specific biological agent (or its toxic products) that can be transmitted from an infected person, animal, or inanimate reservoir to a susceptible host.

- A biological agent that can cause disease is often called a germ or a microbe. Common agents include viruses, bacteria, parasites, fungi, worms (helminthes), and protozoa.
- There are others that appear more rarely (prions, rickettsiae, etc.)

- **Noncommunicable (noninfectious disease) disease is** a disease that cannot be transmitted from infected host to susceptible host -- you can't catch it.

- You can't catch a noncommunicable disease from another person.
- In some cases, a non-biological agent is involved in the development of noncommunicable disease -- such as chemicals or radiation -- but these are not contagious in the usual sense.

Another important classification is based on the **duration of symptoms**.

- **Acute diseases** -- peak severity of symptoms occurs and subsides within three months
  - usually develops quickly
  - may change quickly, leading to recovery, worsening, or death
  - may have a cure
  - often require quick and intensive interventions medically, over a relatively short period of time.
- **Chronic diseases** - symptoms continue longer than three months, and possibly for one's life
  - persists over time
  - usually is slow in developing (not sudden)
  - often without a cure and requiring ongoing management of symptoms
  - common chronic diseases include heart disease, diabetes, asthma, cancer, arthritis and lupus.

Communicable diseases are often ACUTE and noncommunicable diseases are often CHRONIC -- but not always.

Most chronic conditions are non-infectious, and many acute illnesses are caused by an infection.

However, *some* infections lead to chronic conditions - for example, Hepatitis B or C can become chronic. *Some* acute conditions are not infectious - for example, radiation sickness, caused by radioactive material.

Other examples of the interaction between acute and chronic conditions:

- Sometimes an acute episode can happen in the midst of a chronic condition - like a severe asthma attack in someone who has a chronic lung condition.
- Sometimes acute conditions that are not cured develop into chronic conditions - certain strains of human papiloma virus (HPV), for example, can lead to cervical cancer.

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5.4: Genetic Diseases

There is one more category of diseases I'd like you know about, and that's Genetic Diseases. Genetic diseases fall under Chronic Diseases and they are noncommunicable (because, while you may inherit the genes that cause them from your parents, the disease itself doesn't pass to person to person like an ordinary infection).



In public health, we don't usually spend a lot of time on genetic diseases because they are so difficult to prevent. (And public health is all about prevention!) However, there are sub-specialties in public health that work on genetic diseases specifically, such as **genetic counseling.** And there are branches of research -- genetics, microbiology, etc. -- that focus on understanding the causes of genetic diseases and ways to prevent or treat them. Within the National Institutes of Health, there is a center focused on genetic and rare diseases.

Genetic diseases or genetic disorders are those caused by some atypical sequence of genes. To quote the National Human Genome Research Institute:

A genetic disorder is a disease caused in whole or in part by a change in the DNA sequence away from the normal sequence. Genetic disorders can be caused by a mutation in one gene (monogenic disorder), by mutations in multiple genes (multifactorial inheritance disorder), by a combination of gene mutations and environmental factors, or by damage to chromosomes (changes in the number or structure of entire chromosomes, the structures that carry genes).

Public health educators and public health policy advocates can work on increasing awareness of genetic diseases or ensuring that resources are available for people living with a genetic disease and their families. For example, there have been advances in the treatment of sickle cell disease, a genetic disorder that is most prevalent among African Americans and others of African descent. Recent breakthroughs in genetic engineering may even provide a cure, soon. Public health policy advocates (and those working for greater health equity) can work to ensure that such treatments are affordable and widely available, and that the families affected by sickle cell disease are aware of their options.

Genetic medicine is a rapidly expanding field. Recently, we have seen amazing breakthroughs like the ability to cure sickle cell disease (HMS Communications, 2025) and the treatment of a genetic disease in an infant that will greatly extend that child's life (NIH, 2025).

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Harvard Medical School Communications. (2025, Feb. 20). Creating the World’s First CRISPR Medicine, for Sickle Cell Disease. https://hms.harvard.edu/news/creatin...e-cell-disease

National Institutes of Health. (2025, May 15). Infant with rare, incurable disease is first to successfully receive personalized gene

therapy treatment. [News release]. https://www.nih.gov/news-events/news...rapy-treatment

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5.5: Communicable Diseases

These terms are important to understanding how dangerous a specific biological agent (bacteria, virus or other germ) may be to humans:

- **Infectivity** - the ability of a biological agent to enter and grow in the host
- **Pathogenicity** - the capability of a communicable disease agent to cause disease in a susceptible host
- **Virulence** - how severe or dangerous the infection is to the host

So, if an infection has high *infectivity,* a person can catch it easily, but may or may not get sick from it. If an infection has high *pathogenicity*, then those who get infected are likely to get sick. And if an infection is especially *virulent*, then the host (the patient) is going to get very sick.

Examples from Covid:

The Delta variant of Covid-19 had an **infectivity** that is about twice as high as earlier variants that were common in the US, like Alpha. Therefore, it is far more easily passed from one person to another.

The **Omicron** variant (or family of variants) has an even higher *infectivity* -- some researchers say it is even more infectious than measles, which up to now has been known as the most infectious disease on the planet. Fortunately, the *virulence* of Omicron is much less -- most people are not getting as sick as people did with Delta, Alpha, and the original covid virus.

Covid-19 is very capable of causing disease in a host -- yet some people who are infected remain asymptomatic (without symptoms). With the original SARS, the **pathogenicity** and the **virulence** were both worse than with Covid-19 -- more of those infected got sick, and more of those who got sick became very ill or died.

The **virulence** of **Covid-19** varies a lot by age group, with older patients more likely to become dangerously ill, and by several other "virulence factors" (things that increase the likelihood of severe disease among those infected) -- like having a pre-existing condition.

How infection travels:

Infectious (communicable) diseases are diseases caused by a **microbe** of some sort, which can be passed from one person to another (sometimes through an animal, like a mosquito in the case of malaria). The microbes that most commonly cause disease include **bacteria, viruses, and parasites.** Microbes that cause disease are called **"agents"** or **"biological agents"** or **"infectious agents."**

For infection to take place, three things have to happen:

1. There has to be an infectious **agent** present (for example, one person is already infected so the agent is inside that person; or there is a reservoir of the bacteria that cause a disease in an animal population like mosquitoes or rats).
2. The healthy person (also called the "**host**") has to be **susceptible** to infection.
3. The agent (or microbe) has to get **inside** the body of the host (or previously healthy person) *and* establish itself there.

Infectious Agents

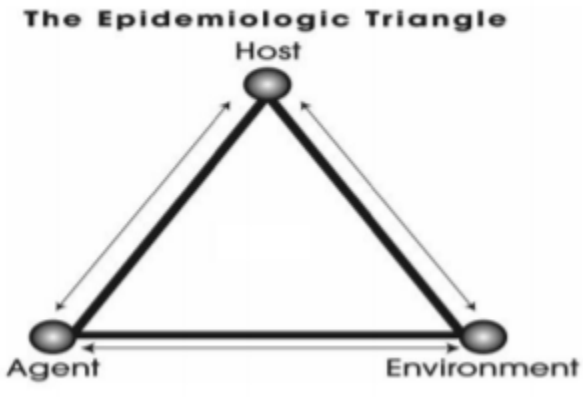
Germ is a common term used to refer to an infectious agent. Microbe is another term we use to refer to an infectious agent (although most microbes do not cause disease!)

Examples of infectious agents:

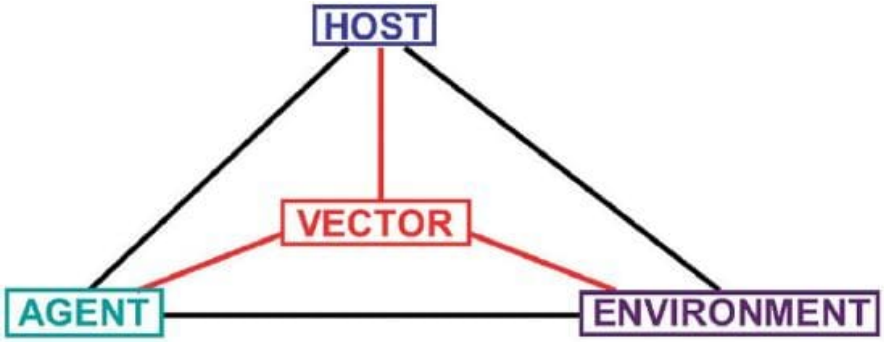
- Virus: Varicella virus causes chickenpox.
- Bacteria: Vibro cholerae causes cholera.
- Protozoa: Plasmodium falciparum causes malaria.
- Fungi and yeasts: Tinea pedis causes athlete's foot.
- Nematoda (worms): Onchocerca volvulus causes river blindness (onchocerciasis)

The epidemiological triangle

The conditions of the **environment** determine whether host and agent will meet, and it can affect both the strength of the agent and the vulnerability of the host.



To understand this process better, and to come up with ways to interrupt the process of infection, public health workers use something called the "**epidemiological triangle.**" The ICPH textbook calls this the "**communicable disease model**." The video I have included below calls it the "epidemiological triad."



All three terms refer to the same thing -- the relationship among host, agent, and environment (and sometimes vector, too, if the disease requires an animal to carry it between people).

The epidemiological triangle depicts the relationship between the agent, host and environment and how these three elements interact and result in health or illness. Changes in one factor can increase or decrease a person's **risk of disease** .

- Consider **the nature of the infectious agent itself**. The agent is the cause of the disease. Can it be easily killed with bleach or another substance? Can it travel through the air in drops of water (such as when a person coughs), or only through blood, or direct skin contact? Does it get aerosolized (tiny droplets suspended in air that can hang around for hours)? If it is a bacteria, are there antibiotics that can kill it?
- Next, think about **the characteristics of the host (or person)**. The host is a person (or other living organism) that gives food and a place to live to the communicable agent. Some hosts are more susceptible than others. You have probably noticed that when there is a cold going around, some people seem to always catch it, while other people rarely get sick. How strong is the host's immune system? Are there behaviors (such as hand-washing) that help the host avoid contact with the agent? Does the age of the host influence how likely they are to get infected?

- And last, consider **the environment**. **The environment includes all other physical, biological or social factors that inhibit or promote disease transmission.** What about the environment makes it more (or less) likely that the host and the agent will come into contact? Can we take actions – such as installing mosquito nets or draining puddles – to make the environment less supportive of disease transmission? Has something changed recently in the environment to increase (or decrease) the chance of disease transmission (like the promotion of wearing masks - or not wearing masks)? This change can be as obvious as a flood that brings sewage (and its microbes) in contact with people, or as non-obvious as increases in travel by airplane (a big factor in the spread of diseases between continents).

- When the disease is **carried by an animal between humans** -- for example, a mosquito bite that carries malaria, or a dog bite that carries rabies -- that animal is called a **vector**. The vector interacts with the other three corners of the triangle (host, agent and environment). A vector is different from a "reservoir," discussed below. Diseases that have vectors are those that usually require an animal to pass it from person to person. When thinking about the likelihood of infection, we have to think about the characteristics of the vector, too, like whether the vector can live in this environment. (With climate change, mosquitoes and ticks are moving into regions they didn't live in before, and that affects transmission of infectious diseases.)

Applying the Model to an Emerging Outbreak

An article in the New York Times (2020) applied the "communicable disease model" or "epidemiologic triangle" to the outbreak in Wuhan province (China) of what was *then* a new strain of Coronavirus. Note these quotes from the article:

> "Is this new outbreak poised to become the next AIDS pandemic or a new SARS, which was stopped in its tracks after 774 deaths? To cut through the headlines, we can use a simple concept called the "epidemic triangle." Employed by epidemiologists since the discipline's earliest days, it is indispensable in predicting whether localized outbreaks will transform into full-blown epidemics."
>
> "Is this outbreak because of a substantive shift in the genetic makeup of an old **pathogen**, a change in the vulnerability of the **host population** or an alteration of the **environment** that has shaped the threat emanating from Wuhan? As the Wuhan outbreak continues to expand, applying the calculus of the epidemic triangle remains the most reliable way to chart an effective public health response while avoiding a descent into hysteria.

How bad is bad?

As we consider the impact of any new disease, it can be helpful to compare it to existing levels of disease.

- In the US alone, the **seasonal flu** causes 9 million to 45 million cases of illness each year, most years, about 140,000-810,000 hospitalizations, and 12,00-61,000 deaths per year. (CDC)
- Globally, **malaria** kills over 440,000 people a year -- most of them children living in sub-Saharan Africa. (CDC)
- In the 2009 **H1N1 flu** pandemic between 150,000 and 575,000 people died worldwide -- most of them younger than the older adult population most affected by seasonal flu. In the US alone, there were about 12,500 deaths. As pandemics go, this was relatively mild -- the H1N1 virus spread easily but was not highly virulent. (CDC)
- As of June 2025, worldwide, there have been over 778 million confirmed cases and about 7.1 million deaths from **Covid-19**. The US alone has reported over 1.2 million deaths (CDC).
- The death rate from covid has declined with increasing immunity (from vaccinations and past cases of covid among the population) and with the less-deadly Omicron variant. Still,

The article goes on to discuss certain characteristics of each corner of the triangle:

- **Agent**: What are the characteristics of this new Coronavirus, SARS-CoV-2? What is its *infectivity* -- that is, how easily does it pass from one person to another? One measure of infectivity is the R0 calculation, which we discussed in the previous module. -- a measure of how many people on average get infected from a single case. The pathogenicity and virulence of Covid-19 are also key to understanding this pathogen, especially as it mutates and new variants emerge.
- **Host**: Are some parts of the population more vulnerable than others? While people of all ages have died of Covid, the groups that are most vulnerable are older people and those with chronic conditions (like diabetes or heart disease). Those experiencing poverty or other structural stressors also had higher rates of disease. Occupation is another important factor in evaluating the host's vulnerability. Since the invention of several effective vaccines against Covid-19, the most important influence on host susceptibility is whether the person has been fully vaccinated and boosted.

- **Environment**: Prior to the development of vaccines to strengthen host immunity, most of the public health prevention measures in this outbreak have been focused on the environment. These measures have included travel restrictions and quarantine of people who may have been exposed. Social distancing, mask wearing, and ventilation have also been key changes in the environment and/or behaviors that impact the environment for others. The use of UV light to sterilize spaces is also being investigated. We do know that indoor environments, especially if crowded or with poor ventilation, increase the likelihood of transmission. As we learn more about a pathogen, we can be more strategic in applying environmental measures. When Covid-19 first hit the US, we were worried about it being transmitted by surfaces -- so we wiped down groceries. Actually, very little transmission happens due to surfaces. Later, we realized it could be aerosolized -- so ventilation became a bigger focus.

Video explanation of the Communicable Disease Model (or Epi Triangle)

I found a brief video by a professor of epidemiology that does a good job of explaining this. **Please watch the following video -- it has closed captions and you can adjust the speed with the gear symbol if you like.**

If you want to know more about the communicable disease model, here is an alternative video explanation (OPTIONAL) -- it's similar but longer and more detailed.

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Werb, D. (2020, Jan. 30). To Understand the Wuhan Coronavirus, Look to the Epidemic Triangle. https://www.nytimes.com/2020/01/30/o...-epidemic.html

World Health Organization. (2025). WHO Covid-19 dashboard. https://data.who.int/dashboards/covid19/

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5.6: Types of Infectious Agents

A few vocabulary words that may be useful here:

- **Case** - a person who is sick with a disease
- **Carrier** - a person or animal that harbors a specific communicable agent in the absence of discernible clinical disease and serves as a potential source of infection to others
- **Zoonosis** - a communicable disease transmissible under natural conditions from vertebrate animals (like bats, birds or pigs) to humans
- **Anthroponoses** - a disease that infects only humans

Biological Agents of Infection

The big three are *viruses, bacteria and parasites*.

- **Viruses:** Viruses are microscopic organisms that can infect hosts, like humans, plants or animals. They're a small piece of genetic information (DNA or RNA) inside of a protective shell (capsid). Some viruses also have an envelope. Viruses can't reproduce without a host. Some common diseases caused by viruses include the flu, the common cold and COVID-19. Viruses cannot be treated with antibiotics (Cleveland Clinic, 2023).
- **Bacteria:** Bacteria are tiny, single-celled living organisms. There are millions of different types of bacteria. Many can be found in and on your body and are beneficial to you. These bacteria make up your microbiome, which keeps your body healthy. Other bacteria can make you sick, often by reproducing so rapidly that they invade healthy tissues, or by releasing toxins that kill off healthy cells. Healthcare providers can treat many bacterial infections with antibiotics. (Cleveland Clinic, 2022).
- **Parasites**: A parasite is an organism that lives on or in a host organism and gets its food from or at the expense of its host. They are responsible for a large amount of disease around the world. Fungi, protozoa, ectoparasites (such as fleas and ticks that burrow into the skin), and metazoa including worms (helminthes) are all types of parasites (CDC, 2024).

Other less-common types include the following:

- *Rickettsiae* are a group of very small bacteria.
- *Prions are* another rare type of infectious agent, perhaps best known in relation to "mad cow disease," Bovine Spongiform Encephalopathy (BSE), and its human correlate, variant Creutzfeldt-Jakob disease (vCJD).

Chemical and Physical Agents

Noncommunicable diseases and injuries can also be caused by the interaction of an agent (non-biological) with a host, within an environment. Chemical agents include substances like pesticides (can cause acute poisoning or chronic conditions like cancer), cigarette smoke and pollutants. Physical agents can cause injuries (speeding objects, vibration, heat) or noncommunicable diseases (radiation). Chemical and physical agents do not cause infectious (communicable) diseases.

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Seabert, McKenzie, & Pinger. (2022). *Introduction to Community & Public Health*. Jones & Bartlett.

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5.7: The Chain of Infection

The Chain of Infection works together with the Epidemiological Triangle (or communicable disease model) to inform strategies for prevention of communicable diseases, responding to the specific biological characteristics of the infectious agent and the broader circumstances affecting its spread.

*Editor's Note: the next paragraph refers to "chapter 6" because that paragraph is quoted from Erin Calderone's book. In this textbook, the epidemiological triangle is discussed in *this* chapter.

Recall in Chapter 6 how the epidemiologic triangle describes infectious diseases. Another model we can use to describe communicable disease spread is the chain of infection. See Fig. 5.7.1 below.

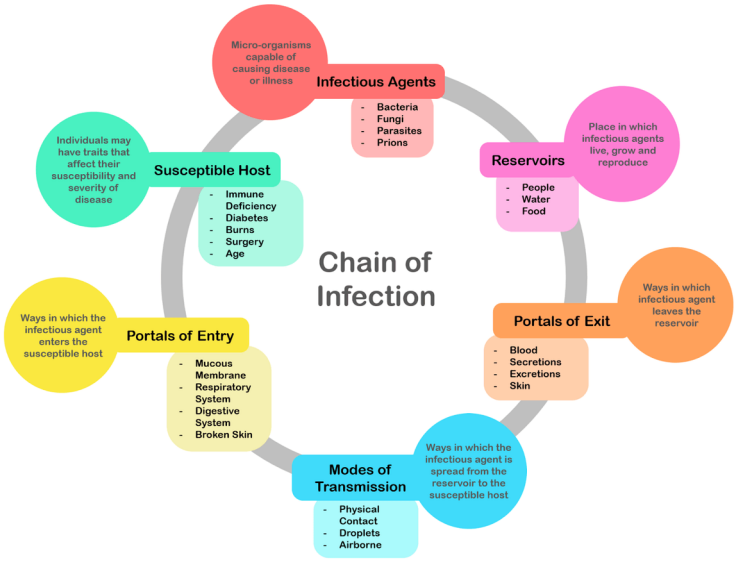


Figure 5.7.1: The Chain of Infection. (Copyright; Genieieiop, CC BY-SA 4.0, via Wikimedia Commons)

The chain of infection model describes each step in the transmission process, as well as those components of the epidemiological triangle (agent, host, environment). In order for a pathogen (agent) to be passed from one living organism to another, there must be a port of exit on the infected individual, a mode of transport, and a port of entry in a new susceptible individual. Hospitable environments are those that encourage this transmission, and potentially the growth of the pathogen outside of a host. Hygiene and workplace safety measures tend to focus on blocking routes of transmission and creating an inhospitable environment for pathogens (National Institute for Occupational Safety and Health, 2023).

To apply the Chain of Infection to prevention efforts, public health workers may ask:

- Can they eliminate the pathogen (agent) itself, or the place it resides (the reservoir)?
- Can they stop it leaving the reservoir? The reservoir is where the pathogen (agent) hangs out when it is not in the host or on its way to the host -- for example, in the body of another infected person, or in a wild animal, or in a body of water. (Examples of ways to stop it from leaving a reservoir include wearing a mask or putting chlorine in a swimming pool.)
- If not, then can they interrupt its mode of transmission? (For example, through filtering the air in a tuberculosis ward in a hospital, as tuberculosis is an airborne disease. Or by reducing skin-to-skin contact in the case of monkeypox, by not having as many sexual parters for a time while monkeypox is circulating in the community of men who have sex with men.)
- If not that, then, can we prevent it from entering the body of another person? (The use of a condom to prevent semen, which may carry HIV, from entering the body of a sexual partner is one good example of this.)
- And if we have not interrupted the cycle of infection before this point, then can we boost the immunity or change the susceptibility of the host (for example, through immunization)? That way, even if the microbe goes into the body of the host, maybe the host can fight off the infection before it takes hold or makes them sick.

As you can see, there are many points to intervene between the appearance of the microbial agent and the infection of the

host. Thinking through **the chain of infection** helps public health workers have an impact.

References

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5.8: Modes of Transmission

You know something about the modes of transmission from your own experience -- there are some communicable diseases you catch only through direct contact with another person, while others you can catch from germs left on a surface of a glass or plate.

What you might not be as familiar with are the differences among diseases that are airborne, vectorborne, or that rely on biological transmission routes.

Direct transmission refers to the immediate transfer of an infectious agent by direct contact between infected and susceptible individuals. For example, monkeypox is usually passed through skin-to-skin contact. HIV/AIDS is another example of a disease that is usually passed through direct transmission. (The exception is when HIV is passed through infected blood in a needle, either in a medical setting or through sharing needles.)

Indirect transmission refers to communicable disease transmission involving an intermediate step. Here are some possible routes for indirect transmission:

- **Vehicle borne transmission** - an inanimate material or object that can serve as a source of infection. Many diseases *can* be transmitted in this way, but for some diseases, this is the *main* way they are spread -- for example dysentery or hepatitis A. One of the most notorious and immoral examples of this was when European colonial settlers gave blankets infected with smallpox to Native American communities, in order to intentionally kill off the Native Americans (genocide).

- **Airborne transmission** - dissemination of microbial aerosols to a suitable portal of entry. An aerosol is different from just droplets of spit that might be spread by a cough or sneeze. An aerosol is a suspension of dust and germs that can spread over a wide area and can stay in the air for a long time. Tuberculosis and influenza are examples of diseases transmitted in this way. Enclosed areas like shelters, crowded housing or nursing homes are prone to outbreaks of airborne diseases. Good ventilation helps disperse the aerosols and prevent the transmission of airborne diseases.

- **Vectorborne transmission** - transfer of disease by a living organism (vector). For example, mosquitoes spread malaria and dengue fever from one infected person to new hosts. While there are some diseases spread **mechanically** by vectors (for example, a fly could infect food by landing on it with its dirty feet), a bigger health challenge is **biological transmission**, where the infectious agent goes through some kind of change inside the vector. With biological transmission, the vector is *necessary* for the disease to be transmitted -- it can't happen any other way -- because the disease agent multiplies or develops in some way inside the vector before transmission occurs.

The difference between vector and reservoir

What's the difference between an animal vector of disease and an animal reservoir of disease?

- Diseases that have a biological vector use the animal (mosquito, tick, dog, whatever) to pick up the agent from one sick person, change it inside their body, then deposit it inside another person (host) to get them sick.
- An animal reservoir (like bats) might hold viruses or other microbe that can make people sick. Once the microbe passes from the animals to humans, though, if the disease continues to spread it is because humans can transmit it person-to-person without involving that animal.



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5.9: Susceptible Hosts and Population Immunity

At the population level, we must assume that if a new communicable disease emerges, all individuals in the population are susceptible to it. For many diseases, those who are younger, older, and/or immunocompromised are at a higher risk of more severe disease. Barring any unique inherited immunity to a specific infection, the two major ways that humans develop immunity are through active immunity ("natural" exposure to the pathogen, and the subsequent immune response), or acquired immunity through vaccination. Both of these trigger an immune system response in each individual who experiences them. Some individuals experience more severe disease than others, and the most severe disease is experienced in natural exposure. In contrast, a third type of immunity is termed passive immunity, where antibodies are received from an external source. The most common examples of passive immunity are antibodies shared between a mother and fetus in utero, or via breastmilk - however some antibody treatments have also been developed for use in medicine.

Below is an oversimplified breakdown of the human immune system response.

- Humoral or innate immunity is the first line of defense. The immune system identifies the pathogen (aka antigen) and creates antibodies to "flag" this antigen and any cells that have been affected by it. White blood cells respond to destroy pathogens and infected cells. Fevers and inflammation are also used to activate chemical messengers and speed up metabolic processes that assist with the immune response. Some antibodies can linger even after the immune response has quieted down.
- Cell-mediated immunity refers to the "memory" of white blood cells (B and T cells) that allows the immune system to respond more quickly to future infections with the same antigen. This type of immunity lasts longer than the elevated levels of antibodies that occur immediately after an infection, or those provided by passive immunity.

Vaccines provide several benefits; both at the individual and population level. To the individual, a vaccine essentially primes the immune system response by triggering a much milder reaction to a dead or weakened (attenuated) virus. Multiple doses may be required to build up this immune response to levels that are protective against future infections. The individual's body may have both specific antibodies and B and T cells stored for many years that protect them from experiencing infection (CrashCourse, 2015, CDC, 2023e).

Some pathogens evolve and/or have several hundred variants - against which it is nearly impossible to create a single vaccine. The influenza virus and SARS-CoV2 are excellent examples of this virulent evolution. Even then, acquired immunity can lessen the severity of infection with a novel strain of the virus. Thus, vaccines can reduce and prevent hospitalizations and deaths from severe disease. For public health purposes, the ideal vaccine also decreases or eliminates infection and infectiousness, and thus prevents people from both contracting and transmitting the pathogen to others.

At the population level, vaccines increase the rate at which population immunity is developed, and decrease the cost in human lives to get there. If there are few or no humans in a community who are susceptible to a particular communicable disease (because they have developed immunity to it), the pathogen is likely going to die out due to a lack of hosts. This can cause the end of an epidemic, called **population immunity, community immunity,** or "herd immunity". The amount of time that it might take for this to occur naturally, along with the number of lives that would be lost, is untenable. (Jones & Helmreich, 2020). Instead, epidemiologists use the concept of population immunity to estimate the vaccination rates required in order to sufficiently protect populations from outbreaks. The more transmissible the pathogen is, the more people will need to be vaccinated to stop it. This calculation uses the estimated number of people a single infected person will likely transmit the disease to, or R0. Thus the vaccination rate would need to be 1-1/R0 in order for the population to develop immunity. If, for example, the average person infected with the flu shared it with 3 other people (R0=3), the vaccination rate would need to be at least 68% (1-⅓) in order to develop population immunity. If the average person who gets the measles infects 12-18 others, then the vaccination rate would have to be close to 100% in order to eradicate the spread (Fine et al., 2011, Guerra et al., 2017). Of course, in real life, imperfections in individual immune systems, global travel, and modern social life add much more complexity to these estimations and the possibility of population immunity. See Fig. 5.9.1 below.

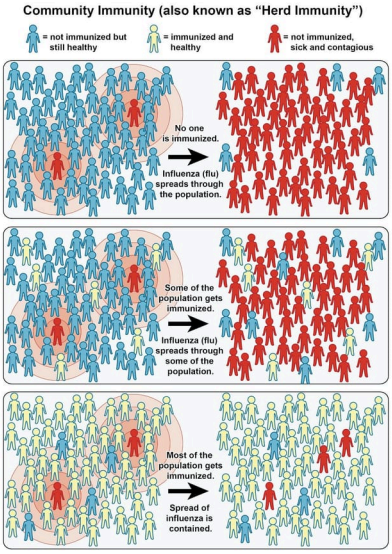


Figure 5.9.1: Community Immunity (aka herd immunity). (Copyright; CC0, The National Institute of Allergy and Infectious Diseases (NIAID))

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5.10: HOW DO WE ERADICATE INFECTIOUS DISEASES?

To completely eradicate an infectious disease from the planet, the pathogen that causes that disease must be completely gone or unable to cause the disease in humans anymore. Although this is a possibility for many diseases, eradication has only happened once - with smallpox. Other diseases have been eliminated from some geographical areas (where there is no longer transmission of that disease), but haven't been completely eradicated. Often, poorer countries are burdened with highly preventable, curable, or treatable diseases that are no longer problematic in wealthier countries. And just because a disease has been eliminated or even eradicated, doesn't mean we don't still need to be prepared for the possibility of it re-emerging, particularly if it is a zoonotic or vector-borne disease (Roser et al., 2024).

5.10.1: Smallpox and Polio

5.10.2: Measles, Mumps, and Rubella

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5.10.1: Smallpox and Polio

Smallpox was a devastating disease that used to kill 3/10 people it infected. Historians think it is at least 3000 years old, as some smallpox pustules have been found on ancient Egyptian mummies. Due to global travel and trade which happened between the 6th and 18th centuries, it spread around the world.

It was Edward Jenner's experiments with using cowpox to vaccinate against smallpox that began the idea of vaccination against disease and opened the door to the possibility of eradicating smallpox entirely. Even after better vaccines were developed, it still took nearly 2 centuries to get rid of smallpox around the world. The last known case of smallpox was in 1977, after the World Health Organization had begun the Intensified Eradication Program (1967). Although smallpox had already been eliminated in Northern Europe and North America in the decades prior, it took additional funding, personnel, and focused surveillance and vaccination efforts to reach eradication. Finally, in 1980, smallpox was declared officially eradicated. In order to decrease the risk of a potential laboratory accident, there are only two labs in the world approved to continue research on the variola virus - one at the CDC in Atlanta Georgia, and the other at the VECTOR Institute in Koltsovo, Russia (*History of Smallpox*, 2021).

Polio has seen a similar worldwide vaccination effort, particularly with the oral version of the vaccine which makes it easier to distribute without the need for healthcare providers to administer it. Two of the three wild polioviruses that cause the poliomyelitis disease have been eradicated, and one is still endemic in just two countries: Afghanistan and Pakistan (Roser et al., 2024). The Global Polio Eradication Initiative (GPEI) launched in 1988, and since then has decreased polio cases from 350,000 to just under 10 annually (CDC, 2023c).

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5.10.2: Measles, Mumps, and Rubella

There are hopes that measles, mumps, and rubella can also be eliminated or eradicated entirely, since humans are the only host for these viruses. The MMR combined vaccine is 78%-97% effective at preventing these infections depending on how many doses are administered (currently, the CDC recommends 2 doses for most). However, sometimes outbreaks can still occur - mostly among the unvaccinated, but sometimes even in highly vaccinated communities. These outbreaks will typically cause milder illness for those who are vaccinated (*Measles, Mumps, and Rubella (MMR) Vaccination*, 2023).

Although measles was declared eliminated (no longer endemic) in the U.S. since 2000 (*Measles Elimination in the U.S.*, 2023), there have still been several concerning outbreaks, and in the last few years a growing concern regarding misinformation and vaccine uptake (Santhanam, 2024). In the 2022-2023 school year, the average vaccination rates for kindergarteners in the U.S. were 93%, down 2 percentage points from 2019-2020. Vaccine exemptions also rose to 3% - mostly non-medical. This is concerning because if exemptions climb to 5% or greater, then population immunity is likely impossible and there is a much higher risk of outbreaks, and losing progress toward elimination (Seither et al., 2023). Perhaps since so few people in America experience these diseases anymore, the public has gained the perspective that there is no longer any need to vaccinate against them. The “Anti-Vax” movement which began with Wakefield’s faulty research (see Chapter 5), saw growth during the COVID-19 pandemic, and has likely also been a cause of increasing exemption requests (Santhanam, 2024). See the figures below for a timeline of vaccine cases between 2000-2025 (Fig 7.3) and 1963-2023 (Fig 7.4).

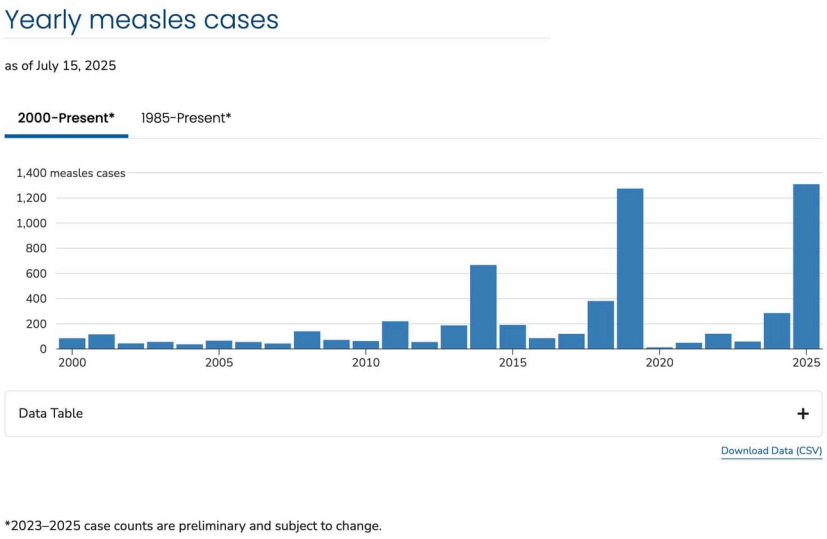


Figure 7.3 Yearly Measles Cases as of July 15, 2025. (CDC, 2025b)

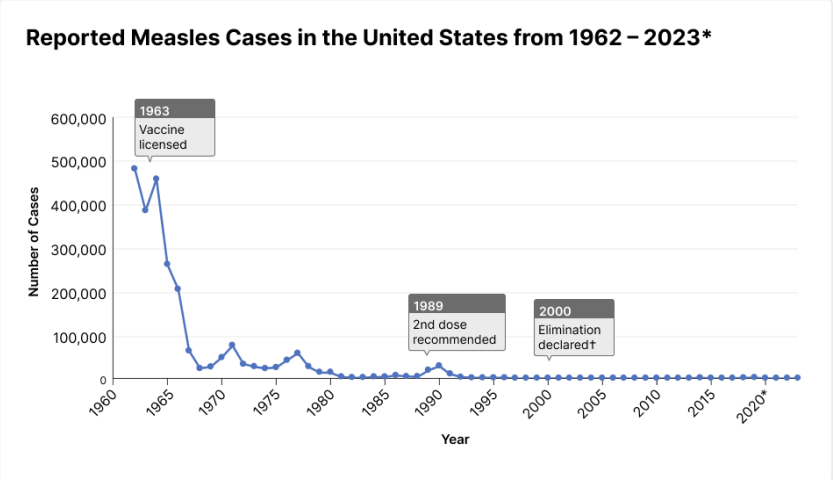


Figure 7.4. Reported Measles Cases in the United States from 1962-2023. *2023 data are preliminary and subject to change. †Elimination is defined as the absence of endemic measles transmission in a region for ≥ 12 months in the presence of a well-performing surveillance system (CDC, 2025b).

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5.11: EMERGING AND RE-EMERGING INFECTIOUS DISEASES

Although we will still focus on eradicating those deadly diseases that we can, history has taught us to also be prepared for new infectious diseases to emerge - and sometimes new variants of old ones to re-emerge. **Emerging infectious diseases** are those that "have recently appeared within a population or those whose incidence or geographic range is rapidly increasing or threatens to increase in the near future."(*Emerging Infectious Diseases*, *Baylor College of Medicine,* n.d.) When certain diseases are on the decline and then the incidence starts increasing again, or perhaps a new disease is discovered from a known pathogen - these are referred to as **re-emerging diseases**.

5.11.1: HIV/AIDS

5.11.2: Other Sexually Transmitted Infections (STIs)

5.11.3: Viral Hepatitis

5.11.4: Influenza Viruses

5.11.5: Coronaviruses- MERS, SARS, and COVID-19

5.11.6: Monkeypox (Mpox)

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5.11.1: HIV/AIDS

**Please note, this page makes reference to a discussion of HIV/AIDS in Chapter 3 -- but that discussion was not included in this version of this textbook. If you would like to consult an optional discussion of the emergence of HIV/AIDS, please see this concise history of HIV/AIDS from the Canadian Foundation for AIDS Research.

In chapter 3 we covered a brief history of HIV/AIDS, which was first discovered in the U.S. the early 1980's, but had likely been a zoonotic disease transmitted to humans at least a century prior. Human immunodeficiency virus (HIV) attacks the body's immune system, particularly white blood cells that typically fight off infectious diseases: helper T cells (CD4+T), macrophages, and dendritic cells. This can lead to dangerously low levels of these cells, which disarms the cell-mediated immune response. If the disease progresses to the advanced stage, it can cause acquired immunodeficiency syndrome (AIDS), in which so-called opportunistic infections and cancers take hold. HIV is a uniquely devastating infection in this way: it attacks the body's defenses themselves, allowing other infections or cancers to easily overwhelm the person's weakened immune system. HIV is transmitted via direct contact with bodily fluids, whether from sex, sharing needles, infected blood transfusion, or perinatally and via breastmilk (Contributors to Wikimedia projects, 2024). Although some people get flu-like symptoms 2-4 weeks after infection with HIV, it may take between 9-11 years for HIV to progress to AIDS (untreated). Within that time frame, a person who does not know their HIV status may transmit it to many more people.(CDC, 2022a).

The most current estimated rates in the U.S. from 2022 are below.

- Incidence: 31,800 new cases (a 12% decrease from 2021).
- Prevalence: 1.2 million people currently living with HIV. The CDC estimates that 13% of HIV positive people are unaware of their status.
- Mortality: 19,310 deaths in people who were HIV positive, from any cause including COVID-19 (HIV.gov, 2025).

Significant medical advancements in testing, prevention and treatment have been made, including: antiretroviral therapy (ART) for those HIV positive, prophylactic medicines for pre-exposure (PrEP) and post-exposure (PEP) treatment. These medicines can decrease viral load to the point that not only is the virus undetectable, it is also not transmissible to a partner (HIV.gov, 2024). There is still a significant negative stigma associated with an HIV positive status, which deters many at-risk individuals from getting tested (CDC, 2022b). Self-tests that can be taken at home may help to reduce testing avoidance.

In 2021, President Biden's administration began the National HIV/AIDS Strategy (NHAS) 2022-2025 which set goals for reducing the number of new infections by 75% by 2025, and 90% by 2030. This plan coordinates national and local efforts, increases public health messaging on HIV, releases funding for testing and PrEP and PEP medications, and focuses on reducing disparities in HIV and addressing the associated social determinants of health (SDOH) (The White House, 2021). According to the 2023 Interim Report, estimated new infections had dropped by 12% between 2017-2023, and the number of people receiving PrEP treatment had increased significantly. Still, the report recognizes that racial, ethnic, and gender disparities still need to be addressed. Also of note in the report is that over half of those living with diagnosed HIV in the U.S. are over the age of 50 (The White House, 2023). However, several offices responsible for carrying out these efforts have been reduced or eliminated during the second President Trump administration in 2025. Although the new Administration for a Healthy America (AHA) office under HHS will include a division on HIV/AIDs, it remains to be seen how this reorganization will affect HIV incidence and access to prevention and treatment across the U.S. (Dawson & Kates, 2025).

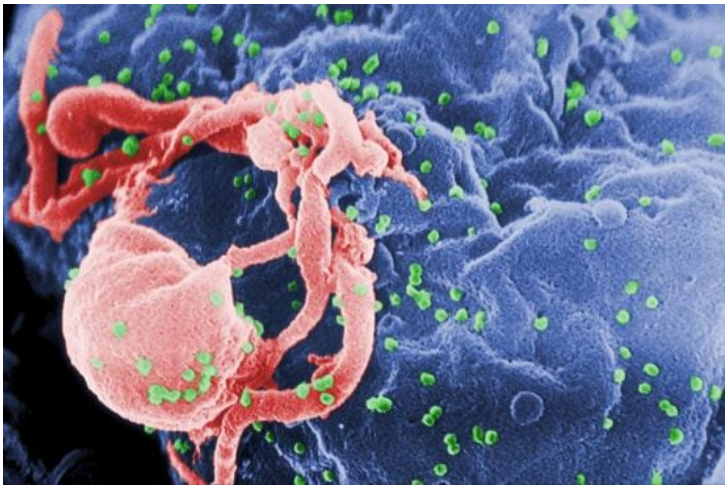


Figure 5.11.1.1: Scanning electron micrograph of HIV-1 budding (in green) from cultured lymphocyte. This image has been colored to highlight important features; see PHIL 1197 for original black and white view of this image. Multiple round bumps on cell surface represent sites of assembly and budding of virions. (Public Domain, C. Goldsmith Content Providers: CDC/ C. Goldsmith, P. Feorino, E. L. Palmer, W. R. McManus - This media comes from the Centers for Disease Control and Prevention's Public Health Image Library (PHIL), with identification number #10000.)

From Fear to Hope: The HIV and AIDS Journey

The following video, released by PBS in 2025, summarizes several decades advances in HIV prevention and treatment, grounded in the science into HIV and AIDS as both biological and social phenomena. At a time when prevention funding, access to medical treatment, and investments in basic science are all being reduced by the federal government, it seems especially useful to revisit this journey with HIV. This video is OPTIONAL and highly recommended.

Interactive Content

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this Interactive Content online

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5.11.2: Other Sexually Transmitted Infections (STIs)

The term sexually transmitted diseases (STD) implies that the STI has progressed into a symptomatic disease state. Many infections can be carried and passed to a partner without experiencing any symptoms - chlamydia, gonorrhea, herpes and HIV are examples of this (*CDC*, 2023b). Evidence-based public health measures include prevention, testing, and early or even prophylactic treatment of partners.

Sexually transmitted infections (STIs) have been on the rise once again in the U.S. In 2023 there were 2.4 million cases of gonorrhea, chlamydia, and syphilis reported, with signs that the recent epidemic of these STIs may be slowing. All of these diseases are bacterial infections, and can be treated with antibiotics. But letting them progress without treatment can cause permanent damage to reproductive organs (as with pelvic inflammatory disease caused by chlamydia and gonorrhea), and tertiary syphilis (which damages many organ systems and can cause blindness, paralysis, dementia, and strokes). Perhaps most concerning, congenital syphilis cases increased 183% over the past 5 years. Congenital syphilis is passed from an infected mother to a fetus and can cause blindness, intellectual disability, stillbirth and infant death. Despite the promising decline in new cases, STIs still disproportionately impact young adults, LGBTQ, and Non-Hispanic Black communities, which highlights the need for health equity in access to testing and treatment (CDC, 2024c).

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5.11.3: Viral Hepatitis

Viral hepatitis comes in several strains of the virus, the most common being A, B, and C. All three affect the liver, and can increase the risk of more serious illnesses like liver cancer. Hepatitis A is transmitted via fecal-oral contamination of surfaces, or utensils, or close personal contact with an infected person. Typically this version causes only an acute illness, but is easily spread without conscious sanitation measures. Hepatitis B and C are transmitted via direct or indirect contact with bodily fluids, including sexual intercourse, contaminated needles, and perinatal infection. Vaccines exist for Hepatitis A and B and are required for school children. There is no vaccine for Hepatitis C, but there are drugs that can cure it in about 95% of cases. These infections may cause acute symptoms like fever, vomiting, abdominal pain, and jaundice, but sometimes these symptoms appear weeks or even months after the initial exposure. Chronic hepatitis symptoms may not be present for years or decades (CDC, 2024a).

A recent report on viral hepatitis provides a summary of new cases reported in 2023 by most states indicates that the rates of hepatitis are declining. While local public health agencies, doctors, and laboratories are required to report cases, there are often cases that go unreported and undiagnosed. The data scientists at the CDC adjust for this underreporting by providing data for both reported cases and estimated acute infections (CDC, 2025a):

Hepatitis A: 1,648 reported cases, 3,300 estimated acute infections

Hepatitis B: 2,214 reported cases, 14,400 estimated acute infections

Hepatitis C: 4,966 reported cases, 69,000 estimated acute infections

The Division of Viral Hepatitis at the CDC has laid out aggressive goals for combating viral hepatitis in the next two years in order to address the climbing rates in the U.S. and move toward global elimination by 2030. The strategies involve increasing vaccinations, testing, and treatment, as well as prevention strategies and national surveillance. Of particular importance is to focus on disproportionately affected groups who might be unaware of their status and/or might otherwise not seek testing and treatment - such as people who inject drugs and those experiencing homelessness (CDC/NCHHSTP/Division of Viral, 2020).

Most cities and major metropolitan areas have public health clinics that provide free STI testing, particularly for the most commonly transmitted infectious diseases. These clinics also provide free condoms and vaccines, as well as testing for other infectious diseases and reproductive cancers, and some also provide HIV PrEP medication and contraceptives. They are an important resource for the communities they serve, and a key touchpoint for gathering surveillance data (*LA County Department of Public Health, n.d.*).

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5.11.4: Influenza Viruses

Of the 4 classifications of flu viruses (A, B, C, and D), only A and B tend to cause illness in humans, with a variety of these viruses causing the typical “seasonal flu” (World Health Organization: WHO, 2023). The subtypes of flu virus that circulate in a given community vary each year, and thus the flu vaccine efficacy also varies depending on the “popular” strains in that community and season. Even so, flu vaccines have been shown to be between 40-60% effective at reducing doctor visits, and also reduce severe illness, hospitalization, and admittance into the ICU for various age groups - especially children and older adults (*Vaccine Effectiveness: How Well Do Flu Vaccines Work?*, 2024).

Type A influenza viruses also include zoonotic strains that are known to have pandemic potential, including “swine flu” (H1N1) and “bird flu” or “avian flu” (H5N1). The swine flu is particularly deadly, causing a mortality rate close to 50%, whereas the avian flu was much less deadly but easily spread between humans. There is significant concern that a new influenza virus could emerge that employs both properties of virulence and severe disease, which could cause a deadly pandemic around the world (*Emerging Infectious Diseases*, *Baylor College of Medicine,* n.d.).

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5.11.5: Coronaviruses- MERS, SARS, and COVID-19

Coronaviruses are a group of viruses that can cause upper-respiratory infections like the common cold, with symptoms like fever, cough, runny nose, and a sore throat. They are called coronaviruses because of how they look under a microscope: spikes on the surface give the virus a crown-like appearance. In some cases, coronaviruses can lead to severe infections like pneumonia and certain strains can cause significant morbidity and mortality. Coronaviruses are also zoonotic infections, and have been found in bats, palm civets, and camels. In fact, zoonotic transmission to humans is how the more severe coronaviruses such as SARS and MERS are thought to have first emerged.

Severe Acute Respiratory Syndrome (SARS) was a coronavirus first discovered in 2002 in China and rapidly spread to several countries, causing over 8,000 cases and 800 deaths. Yet the public health response was swift; and even though this severe illness had spread to over two dozen countries, the outbreak was brought under control within the following year (*SARS and MERS*, n.d.).

Middle East Respiratory Syndrome (MERS) emerged in 2013 in the Middle East, and was thought to have been transmitted from camels, who probably got it from bats. Although this disease was less easily spread between humans than SARS, it caused more severe disease and the mortality rate appears to have been much higher - around 35% of cases cause death (SARS and MERS, n.d.). Between April 2012 and January 2024, there have been 2609 lab-confirmed MERS cases, and 939 deaths - and the majority of cases have occurred in Saudi Arabia (WHO Eastern Mediterranean Region, 2024).

SARS-CoV-2 is the virus that causes COVID-19 illness, and began the worldwide pandemic in December of 2019. What made this virus able to spread across the globe so rapidly was its virulence: unlike SARS and MERS before it, the virus could be transmitted to other humans even when the infected person showed no symptoms. Although it seemed as though the mortality rate of the disease was relatively low and decreased significantly over the next 2.5 years, the disease caused over 1 million deaths in the U.S. alone during that time simply due to the large numbers of people it affected (*SARS-CoV-2 and COVID-19*, n.d., CDC, 2024c).

The pandemic also had a huge impact on other biological and social determinants of health. Healthcare systems were overloaded, healthcare staff were at high risk of contracting the disease - especially with shortages of personal protective equipment (PPE). Fears of catching the virus kept people from seeking healthcare for other issues like managing chronic diseases (*SARS-CoV-2 and COVID-19*, n.d.). Businesses and schools were closed, and job losses created huge economic (and health insurance coverage) impacts which hit the lowest socioeconomic tiers the hardest.

Vaccines for COVID-19 were soon developed and clinical trials were fast tracked during 2020. By the end of 2020 and beginning of 2021, vaccines were given emergency use authorization (EUA) by the FDA. Three vaccines were used in the U.S. - the Moderna and Pfizer vaccines were mRNA vaccines, and the Johnson & Johnson vaccine utilized a vector. All three vaccines were unique in that they did not carry a killed or attenuated virus - rather they used different mechanisms to provide information to the human body to create the unique spike protein on the surface of the virus. The body's immune system could then recognize this spike protein and mount a defense against it. Although these vaccines were developed and tested in a far shorter time than expected, they built on research that had been going on for decades (National Institutes of Health, 2023).

The vaccines demonstrated high levels of safety and efficacy against the initial variants of SARS-CoV-2. As new variants emerged, it became clear that the vaccines were less likely to protect against infection completely, yet they still offered protection against severe disease, reduced hospitalizations, and even reduced viral load (which can potentially reduce transmission) (Oordt-Speets et al., 2023). It is estimated that vaccines prevented another 66 million infections and 2 million deaths (National Institutes of Health, 2023).

Vaccine hesitancy and misinformation also had an effect on vaccine uptake. Vaccine myths were perpetuated over social media and political venues, including proposals that the vaccines included microchips, made the vaccinated magnetic, affected fertility, or caused deadly heart problems in young males (CDC, 2023d, CDC, 2023e, CDC, 2023h). As of May 2023, over 81% of Americans had received at least one dose of the vaccine, and almost 70% had taken the recommended 2 doses. Subsequent booster uptake for new variants was significantly lower (CDC, 2023a).

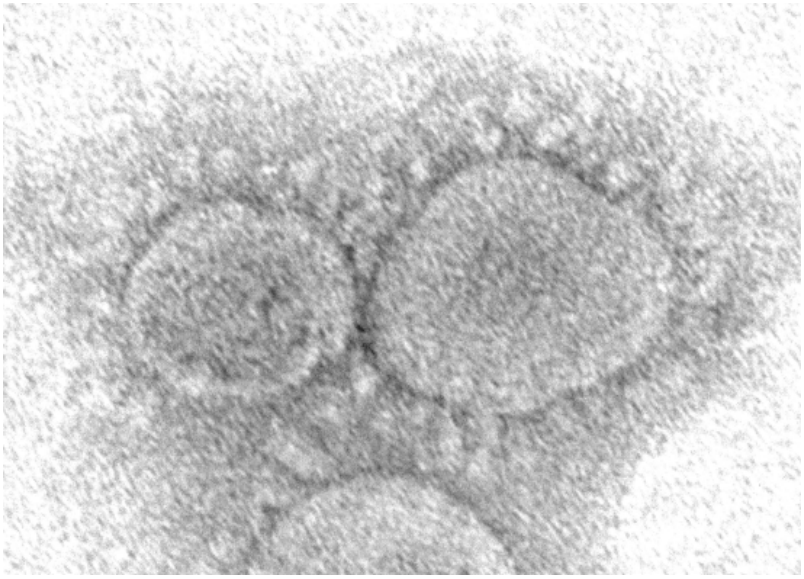


Figure 5.11.5.1: Electron microscopic image of a negatively stained particle of SARS-CoV-2, causative agent of COVID-19. Note the prominent spikes from which the coronavirus gets its name for “corona”, or “crown-like”. (Copyright; CC0, CDC/ Hannah A. Bullock and Azaibi Tamin)

Electron microscopic image of a negatively stained particle of SARS-CoV-2, causative agent of COVID-19. Note the prominent spikes from which the coronavirus gets its name for “corona”, or “crown-like”. CDC/ Hannah A. Bullock and Azaibi Tamin

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5.11.6: Monkeypox (Mpox)

Mpox or monkeypox is caused by a virus related to smallpox, and was named so because it was first discovered in small primates. Mpox can be transmitted via direct contact with an infected person (including sexual contact), as well as indirect contact by fomite (surfaces or objects touched by the infected person). There are two types of Mpox (called “clades”), one has a much lower case-fatality rate than the other (10% vs. <1%). In 2022 there was an outbreak of the latter strain of Mpox that traveled around the world and caused over 94,000 cases, many of which had not previously reported Mpox. Fortunately, a vaccine is available that has a 70% vaccine effectiveness measure, which means that vaccinated cases are 70% lower than unvaccinated cases (Mpox, 2024).

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5.12: Noncommunicable Diseases

Common Noncommunicable Diseases

What do you know about these common diseases?

Diseases of the Heart and Blood Vessels

- Coronary heart disease - a chronic disease characterized by damage to the coronary arteries in the heart
- Aterosclerosis - a narrowing of the blood vessels
- Cerebro-vascular disease (stroke) - a chronic disease characterized by damage to blood vessels of the brain resulting in disruption of circulation to the brain

Other Noncommunicable Diseases

- Malignant neoplasms (cancer) - uncontrolled new tissue growth resulting from cells that have lost control over their growth and division
  - Metastasis = the spread of cancer cells to distant parts of the body by the circulatory or lymphatic system
- Chronic obstructive pulmonary disease and allied conditions
- Diabetes mellitus
- Chronic liver disease and cirrhosis
- Some psychological disorders like depression are also considered to be chronic noncommunicable diseases, as are some addictions

Prevention and control of heart disease, cancer, strokes and other noncommunicable diseases are of urgent concern in the United States and around the world.

Indeed, while malaria, TB, HIV and other infectious diseases are still a serious problem, noncommunicable diseases are on the rise and have surpassed infectious diseases as the leading causes of death worldwide. (Exception: the Covid-19 pandemic has been a leading cause of death in 2020-2022, at least.)

Reducing heart disease incidence and deaths are among the great public health achievements of the 20th and 21st centuries.

This 5-minute video from APHA discusses heart disease, why it is so prevalent, and what we can do about it:

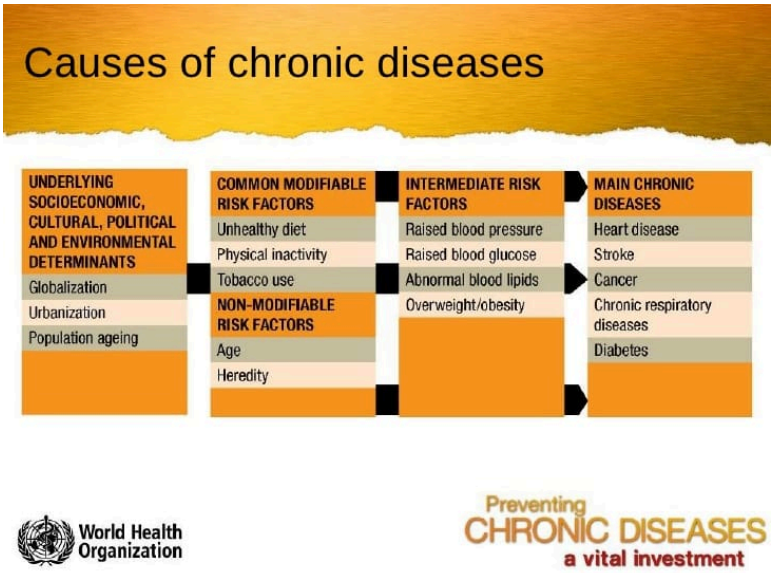
YouTube Video

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this YouTube Video online

This infographic below from the World Health Organization shows the connection between the social determinants of health, the risk factors for chronic diseases (especially the modifiable ones), the intermediate risk factors (or precursors to disease), and the main chronic diseases. One positive thing about understanding a model like this one is that a single prevention effort can reduce the rates of many chronic diseases. For example, reducing tobacco use reduces lung cancer, but it also reduces at least 30 other kinds of cancer and the #1 killer worldwide, heart disease. Improving access to healthy food and physical activity reduces rates

of diabetes, cancer, stroke, heart disease, arthritis, kidney disease, and more. Prevention efforts can really pay off!



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5.13: Multi-Causation Models of Disease

America's leading causes of death are mostly noncommunicable diseases, with complex etiologies. Think about cancer, heart disease, lung disease, kidney disease -- these are not caused by a single factor.

Etiology means the study of causes -- so etiologies of disease are the causes of disease. Unlike a communicable disease where we can point to a single agent (HIV, in the case of AIDS, for example), we can best understand noncommunicable diseases using a multicausal model.

A multicausation disease model is a visual representation of the host togetherwith various internal and external factors that promote and protect against disease.

This is sometimes also called the "web of causation," because it's like a spider web, with interconnected strands. Sometimes you will see a multi-causal model drawn more like a web, or a bowl of spaghetti!

Below, you will find a picture of a multicausation (or multicausal) process through which disease can develop (Seabert, McKenzie, & Pinzer, 2022).

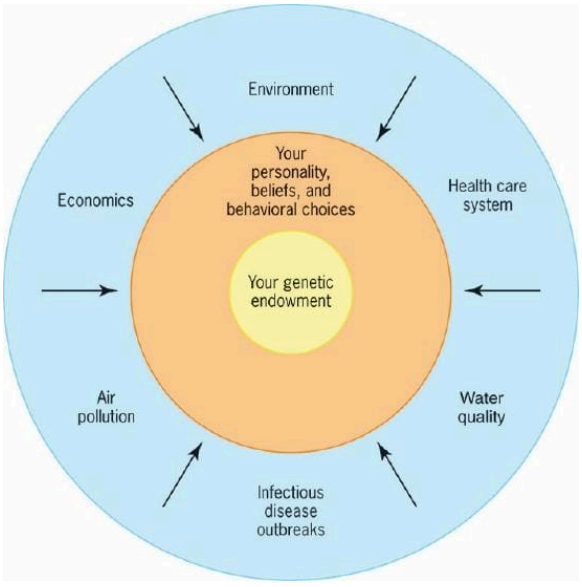
Etiology

Etiology means the study of cause -- so etiologies of disease are the *causes* of disease.

Communicable diseases are caused by biological **agents**. Noncommunicable diseases are not.

Often, we can best understand noncommunicable diseases using a **multicausal model.**

Noncommunicable diseases have **complex etiologies.**



This Multicausal Model puts **the individual with their own genetic endowment** (the genes they inherited *plus* any mutations that occurred since conception) at the center. Genes have a large influence on health! Some genes directly cause disease or disease-resistance, while others influence things like our metabolism, our resiliency to stress, how strong our teeth are, and other aspects of health. Genes themselves can be influenced by **epigenetic adaptations**, meaning that even our genes can be influenced by the nurture we receive as babies and the environment we grow up in. The genes don't change but they can get turned on or turned off "epigenetically". (If this term "epigenetics" is unfamiliar to you, don't worry about it -- it's a level of detail that I want to acknowledge but I don't expect you to define or explain. I'll leave that for a more advanced biology course!)

The next level of influence on the development of noncommunicable diseases includes **personality, beliefs and behaviors**. A behavior like heavy drinking of alcohol or non-ceremonial use of tobacco can certainly cause or influence the development of disease. Our behaviors are shaped by our personality and beliefs, too -- if we are very impulsive, for example, it may be difficult to refrain from unhealthy behaviors that are fun or popular.

The last layer of the multicausal model includes **everything else in our environment that influences the development of disease**, from living near an outbreak of disease, to air and water quality, to the economics of our family, community and society, to the quality and quantity of healthcare we can access. Can you think of other examples of factors that belong at this level? Think about the materials on Social Determinants of Health, for example.

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5.14: The Multi-Causation Model and the Ecological Model

The **etiology** (or cause) of a disease is often complex. Even when we know a specific **agent** causes a disease (for example, SARS-CoV-2 causes Covid-19), how a person gets exposed to that agent involves both the physical and social environment. We see this in the model of communicable disease (the epidemiological triangle). It is also true that noncommunicable diseases are complex -- and usually not traceable to a single agent. The social-ecological model (or just ecological model, or eco model) is one useful tool for visualizing the interaction of risk factors that contribute to disease or injury, and you have seen that model in previous modules. We see it again in Chapter 5 of the ICPH textbook.

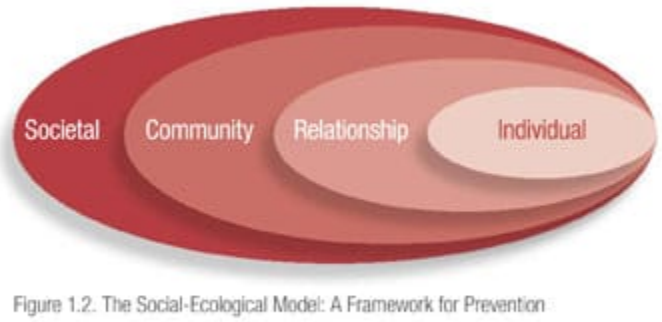


Figure 1.2. The Social-Ecological Model: A Framework for Prevention

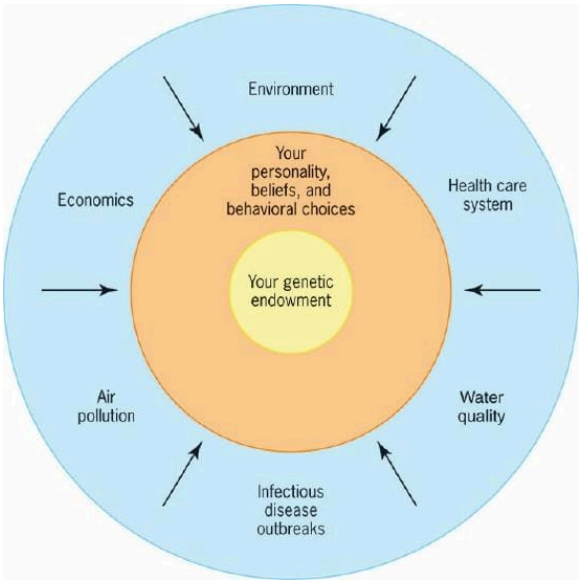
Figure 1.2. The Social-Ecological Model: A Framework for Prevention

In Chapter 4, your textbook discusses the Multi-Causation Model or multicausal model (Figure 4.6 in your ICPH textbook). You can see that **there are similarities between the two models.** They are both drawn with overlapping circles or ovals -- like an onion -- to show the influences of more-distant factors on the health of individuals. They both see diseases as arising from a web of causation, a web of complex factors that contribute to higher or lower rates of disease in a population. They both can be applied to diseases or to injuries, or even to health-endangering behaviors like tobacco use or binge drinking.

There are also some important differences.

- The multicausal model has two circles to represent the individual. One level is a person's genetic endowment, what they are born with. You could call this their unmodifiable risk factors. The second circle out is a person's health beliefs and behaviors -- you could call this their modifiable risk factors.
- The multicausal model does not emphasize social relationships (friends, families, peers, coworkers) as much as the ecological model does.
- The characteristics of both community and society are included in the outermost circle of the multicausal model.

In the multicausal model, the outer circle notes risks generated by the environment, economics, air pollution (and presumably other forms of pollution), the presence of infectious disease outbreaks in the area, water quality, and health care systems (access, cost, quality, etc.). You can imagine that many of these factors or causes can exists both in a local community and in society as a whole. For example, a local coal-burning electric plant might be a community risk factor for asthma, but national energy policies might establish limits on how much smoke it can emit.



Both of these models are useful in analyzing how diseases and injuries arise and how to focus prevention efforts.

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5.15: Prioritizing Prevention and Control Efforts

In an ideal world, we would address all health problems that affect communities. Rare diseases would be researched as well as common ones, and methods of preventing cancer would be plentiful.

In fact, we know that some diseases get much more attention and research dollars than others. Sometimes this is due to a profit motive, when pharmaceutical companies see a chance to money on certain diseases. Sometimes politics and the social status of the affected group comes into play -- if you watch the classic documentary The Age of AIDS, for example, you will see how the government dragged its feet in responding to this terrible pandemic in the early years, in large part because the groups affected (gay people, drug users, Haitians and Africans) were not valued highly by that government.

Yet even if politics and profit did not have undue influence, it is still true that public health often has limited resources and personnel to dedicate to preventing and controlling health problems. Which ones should be prioritized?

Setting priorities for community health: 3 key considerations

Communities have to determine how to deal with their health problems, deciding which most urgently require action. There are many criteria that can be used for making such decisions, but the following three are often key:

1. the number of people who die from a disease (leading causes),
2. the number of years of potential life lost (YPLL), and
3. the economic costs ($$) associated with a particular disease.

After reading the explanation of these three, ask yourself, what additional criteria might you add?

Leading Causes of Death

For more than 80 years, the leading cause of death in the US has been heart disease. But as heart disease deaths have decreased since 1950 and cancer deaths have increased, the difference between these two leading causes of death has narrowed. Indeed, in some populations, cancer kills more people than heart disease does. According to the CDC's Fast Stats for 2019 (pre-pandemic), heart disease was the leading cause of death for non-Hispanic whites and non-Hispanic blacks -- but cancer was the leading cause of death for non-Hispanic Asians and Pacific Islanders and for Hispanics of all races. The variation was also regional. While heart disease was the leading cause of death in most states, 22 states experienced more deaths from cancer in 2014. And in 2020, the rates of death in rural areas were higher than in urban areas for all 10 of the leading causes of death.

Here are the ten leading causes of death for the United States overall in 2023 (with the number of deaths for each cause), according to the CDC. Together, these 10 causes account for well over half of all deaths in the U.S. Note the extremely large impact of heart disease and cancer, compared to all other causes. Since 2020, of course, Covid-19 has entered the list of causes of death. It was the third most common cause of death in 2020 and 2021, and the fourth most common cause of death in 2022. It dropped to 10th in 2023. Unintentional injuries (accidents) which include overdose deaths also rose in recent years.

1. Heart disease: 680,981
2. Cancer: 613,352
3. Accidents (unintentional injuries): 222,698
4. Stroke (cerebrovascular diseases): 162,639
5. Chronic lower respiratory diseases: 145,357
6. Alzheimer's disease: 114,034
7. Diabetes: 95,190
8. Nephritis, nephrotic syndrome, and nephrosis: 55,253
9. Chronic liver disease and cirrhosis: 52,222
10. COVID-19: 49,932

Source: CDC: Fast Stats, Leading Causes of Death https://www.cdc.gov/nchs/fastats/lea...s-of-death.htm

Years of Potential Life Lost

The meaning of this measure YPLL is explained more in Chapter 3 of ICPH and in the Lesson from Module 3. When this measure is taken into account, diseases that kill all ages are emphasized, appearing as important as those that kill primarily older adults. Similarly, if you take into account disability (for example, using DALYs, as discussed in Chapter 3), then diseases that don't kill people quickly but limit activities of daily life gain in visibility.

Economic Cost to Society

The data to assess broad economic costs are hard to come by. Costs are often judged by governmental spending, such as Medicaid and Medicare expenditures. By this measure, diseases that cause frequent hospitalizations, such as congestive heart failure, or that require expensive organ transplants (such as liver and kidney diseases), become more prominent.

Efficiency: Killing Two Birds with One Stone

This final criteria is *not* one frequently discussed, but I think it merits a mention.

When you understand that certain health behaviors and certain social circumstances lead to a vast array of health problems -- whether you start from an analysis of the social determinants of health or you look at the long-term effects of childhood adversity, or you point to the "actual causes of death" -- the thing that made a person sick with the disease that killed them -- such as tobacco (which causes over 480,000 deaths a year, largely from heart disease and more than 30 types of cancer) and sedentary lifestyle (a recent European study found physical inactivity caused twice as many deaths as obesity) -- then you can reorient your prevention efforts away from *disease-specific* prevention and control efforts, and more toward *creating the conditions for good health*.

When you build healthy communities, you prevent all sorts of bad health outcomes, killing much more than two birds with one stone, to borrow that expression.

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5.16: Prevention, Intervention, Control, and Eradication of Diseases

Please review the 3 tabs of information below, to help you distinguish among PREVENTION, INTERVENTION, and CONTROL.

Roll over the tabs to view more information.

Prevention	Intervention	Eradication
		
The planning for and taking of action to prevent or forestall the occurrence of an undesireable event (like an outbreak of a communicable disease, or an increase in the prevalence of a chronic condition). Examples include promoting healthy eating through farmer's markets, school lunches and access to supermarkets.	Efforts to control a disease in progress. Examples include working to reduce the spread of sexually-transmitted infections, screening for high blood pressure so cases can be referred for medical help, or assisting diabetics to make long-term changes to their diets.	Efforts to control a disease in progress. Examples include working to reduce the spread of sexually-transmitted infections, screening for high blood pressure so cases can be referred for medical help, or assisting diabetics to make long-term changes to their diets.

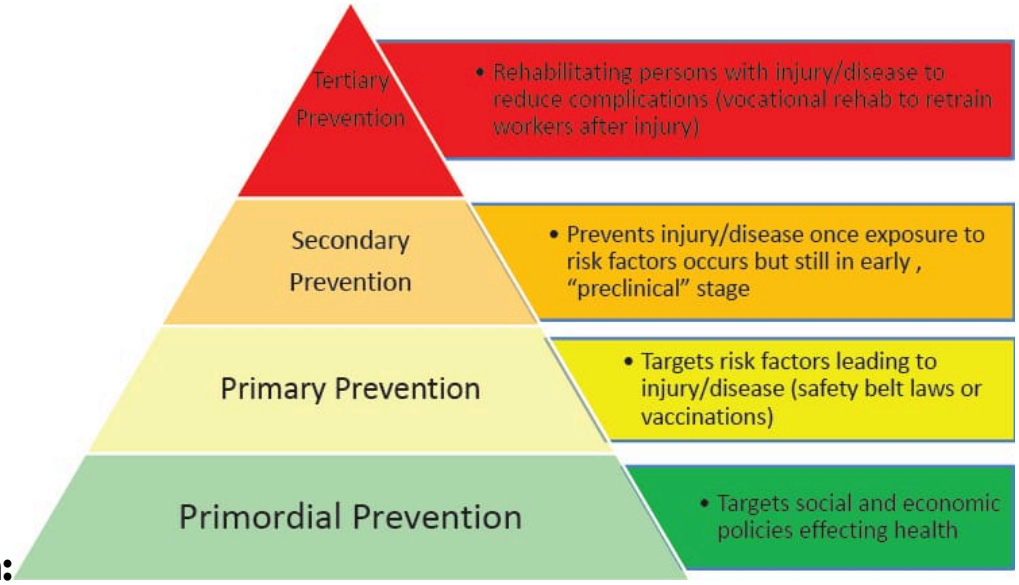
Eradication of diseases does not happen often. Eradication means that we have stamped out the disease completely. Small pox is the most famous case of eradication of a disease, and polio has been close to eradication several times. If a disease lives only in humans, as small pox does, there is a chance of eradicating it for good. When a disease has an animal reservoir -- for example, the Ebola virus that can live in bats and some other animals -- even when an epidemic is successfully overcome and no humans in that area have the disease, we can't say it is eradicated, since it's possible for it to jump from the animal species to the human species again. For this reason, I doubt that Covid-19 will ever be eradicted, although I do expect that the pandemic will end and the disease will be more easily controlled.

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5.17: Levels of Prevention

Every public health professional knows the meaning of the three levels of prevention: "primary prevention," "secondary prevention" and "tertiary prevention". I am sure you will come across these terms in various readings this semester. Many publications (like ICPH) refer to this as the "levels of prevention." You may also see it referred to as the "public health model."

You can think of Primary Prevention as moving more "upstream" and Tertiary Prevention as moving more "downstream." The graphic below from the National Academies Press visualizes the three levels of prevention, plus an additional one they call "primordial prevention" to address the social determinants of health. Other public health writers might just fold that into Primary Prevention.



Primary Prevention:

Primary Prevention means taking preventive measures that forestall the onset of illness or injury during the "prepathogenesis period" -- that is, before the illness or injury begins. These preventative measures are usually taken for everyone -- not just a select group.

When? Prevent a disease or injury before it starts.
For whom? Population-wide measures.

Secondary Prevention:

Secondary Prevention includes preventive measures that lead to an early diagnosis and prompt treatment of a disease or injury to limit disability and prevent more severe pathogenesis (illness or injury)

When? Early intervention – when the first signs of trouble appear.
For whom? At-risk groups.

Tertiary Prevention:(may include Treatment)

Tertiary Prevention uses measures aimed at rehabilitation following significant pathogenesis (illness or injury)

When? After the disease or injury has occurred – act so that it doesn't get worse or recur
For whom? People who have the disease or injury.

You can see the three types of prevention vary by WHEN they happen, and FOR WHOM.

In many ways, the "gold standard" for public health is **primary prevention**– preventing a health problem before it even starts. For primary prevention, you work on changing health conditions for everyone – they are population-wide measures, or at least measures that reach a large segment of the population – that address the underlying root causes and risk factors. Here are some examples of successful public health programs that achieved primary prevention:

- Eliminating the small pox virus from the face of the earth
- Eliminating lead from gasoline in the United States
- Designing curbs, curves and sidewalks in such a way to slow down traffic to reduce accidents and protect pedestrians

Secondary prevention involves identifying groups at higher risk of a disease or injury, and then targeting interventions for them. Screening people for a certain disease or trait is a common secondary prevention measure. (Some screening is universal, but most of the time, screening tests are targeted to high-risk groups.) Secondary prevention may involve outreach to populations known to be at higher risk for a disease. It may even involve treating a symptom or condition that is a precursor to a more serious disease – such as treating high blood pressure (hypertension) because it often leads to heart disease. Here are a few more examples:

- Offering support groups to people who have been displaced by major forest fires, and using the support groups to screen for depression or other treatable conditions.
- Conducting violence-prevention workshops with youth who have been exposed to violence in the past.
- Providing cholesterol screenings for all employees over the age of 45.

Tertiary prevention ("tertiary" means "in third position," just like "secondary" means "in second position") usually involves treatment. (This is where public health and medicine meet!) A person who has suffered one illness or injury is treated with the intention of preventing a worse outcome (like disability or death), or a recurrence of the problem. In this case, the prevention efforts are closely targeted for those who already have the health problem. Here are some examples of tertiary prevention:

- Prescribing medications and rehabilitation therapy for someone who has survived a heart attack.
- Providing occupational therapy for someone who has a brain injury, to enable them to regain functioning.
- Prescribing a drug called tamoxifen to women who have survived breast cancer, in order to prevent a recurrence of the cancer.
- Prescribing methadone or bupronorphine to a person with an opioid addiction.

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5.18: Prevention of Communicable Diseases

We can use the 3 levels of prevention together with our understanding of the etiology of communicable diseases (infectious diseases) -- the epidemiological triangle and the chain of infection -- to come up with a plan for prevention.



Here are some examples.

Primary prevention of communicable diseases

- Community measures - for example, chlorination of water supply
- Personal measures - for example, proper hand washing

Secondary prevention of communicable diseases

- Individual measures - self-diagnosis and self-treatment; diagnosis and treatment from a health care professional
- Community measures - limiting the extent of an epidemic
  - Isolation - the separation of infected persons from those who are susceptible
  - Quarantine - limitation of freedom of movement of those who have been exposed to a disease and may be incubating it
  - Disinfection - the killing of communicable disease agents outside the host; on countertops, for example

Tertiary prevention of communicable diseases

- Individual measures - recovery to full health
- Community measures - preventing recurrence of an epidemic

Application of prevention measures in the control of a communicable disease: HIV infection example

Bloodborne pathogens are disease agents, such as HIV, that are transmissible in blood and other body fluids

Bloodborne Pathogens Standard - a set of regulations promulgated by OSHA that sets forth the responsibilities of employers andemployees with regard to precautions to be taken concerning bloodborne pathogens in the workplace. *What do you think would make for a safer workplace in hospitals and other places that workers may come into contact with infected blood?*

You might think about individual actions, personal protective gear, safer needles and sharps containers, safety procedures, inspections for enforcement (assurance), and the role of patient advocates and worker advocates in maintaining safety.

The Bloodborne Pathogens Standard helps with breaking the chain of infection in very direct ways (e.g., safer needles). But in public health we can also look more broadly at the prevention of HIV and AIDS -- how do we reduce stigma and discrimination that contributes to risk-taking behavior? How do we create a society where discussion of sex is freed of shame? What measures are needed for harm reduction, so that those who inject drugs don't suffer an HIV infection?

Photo credit: CDC

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5.19: Vaccination and how rates are changing in California

Vaccination can prevent against communicable diseases by building immunity in the person who is vaccinated. Their body learns the disease by exposure to either a weakened version of the pathogen or another stimulus to produce antigens. (Remember the cow pox example from Week 1?) Vaccines are never 100% effective, though, so some people who have been vaccinated may still be vulnerable (a very small percent of people). And some people -- because they have HIV or are fighting cancer or are too young to be vaccinated yet or have some other vulnerability -- cannot receive vaccines. In those cases, their protection from disease depnds on **herd immunity**.

When a large percent of a population is immune to a disease (because they were vaccinated or because they already had it and survived) that is **herd immunity**. What percent of the population needs to be immune to a disease in order to create herd immunity varies, according to how infectious the disease is. For measles, 95% is the goal -- if 95% of people are vaccinated against or immune to measles, for example, then even this very infectious disease won't spread far. For Covid-19, earlier this year, it was thought that 70-85% of the population would need to be immune, in order to stop the spread of Covid-19. Since the Delta variant is twice as infectious as earlier variants, that number has gone up.

> Since I first wrote the information on this page, several effective vaccines against Covid-19 have been developed. While on one hand, the devastation this disease has wrought has made many people eager to get vaccinated, others are still hesitant.The hesitation comes from several different sources, each of which might need a different strategy to address.
>
> Some of the sources of vaccine hesitancy:
>
> - Ongoing history of medical abuses of communities of color and poor communities
> - Not understanding how the vaccines could be safe if they were developed so quickly
> - Political or ideological views, which could influence people to downplay the pandemic or distrust the government
> - Hating or fearing shots
> - Having unanswered questions
> - Not wanting to be the first -- wanting to see someone they know get the vaccine and see how it goes
>
> I also have to mention the vast quantity of **misinformation**about vaccines that is circulating. I recommend checking what you read against reliable sources like the CDC!

For Covid-19, while it is theoretically *possible* to achieve herd immunity eventually without a vaccine, the cost in human lives would be enormous, and it would take many years.

Please view this brief explanation of herd immunity from the Oxford Vaccine Research Group:



Vaccinations are controversial, though, because some parents fear the possible negative effects of vaccination more than the diseases that the vaccines protect against. Now, it is true that a very small number of people will have negative reactions to vaccines, just like any other medication or food or procedure. There are systems to compensate people who are injured by vaccines, because of that. But many people are afraid of effects that are NOT actually caused by vaccines. The link between vaccines and autism, for example, have been **thoroughly disproven** -- yet many parents still fear it.

More people are hesitant about vaccines than hard-set against them, and so conversations with trust, empathy, and information can sometimes shift someone's views on vaccines.

Widespread reluctance to get vaccinated has caused a new public health crisis in infectious disease. In recent years, we have had significant outbreaks of measles, whooping cough, and other diseases. With many routine medical appointments and vaccinations being postponed due to the Covid-19 pandemic and social distancing rules, many health professionals worry that we may see even lower rates of vaccination and more outbreaks of disease. And the hyped-up fears about the covid vaccines could lead to more hesitancy to get flu shots, childhood immunizations, and other vaccines.



Photo credit: CDC

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5.20: Examples of Prevention of Noncommunicable Diseases using the 3 levels of prevention

You can use the 3 levels of prevention to think of strategies at the individual and the community or societal level that can create good conditions for health, contributing to the prevention of cancer, heart disease, and other noncommunicable diseases.

Primary prevention of noncommunicable diseases

- Individual measures - education, healthy lifestyle practices
- Community measures - adequate food and energy supply

Secondary prevention of noncommunicable diseases

- Individual measures - personal screenings
- Community measures - provision of mass screenings

Tertiary prevention of noncommunicable diseases

- Individual measures - significant behavioral or lifestyle changes
- Community measures - adequate emergency medical personnel

Now -- Try it yourself!

How would you apply preventative measures to prevent (or reduce the incidence of) heart disease? (or another noncommunicable disease, if you prefer)

Use all three levels (primary, secondary, and tertiary) and take into account the multicausation model or the ecological model, or another way of considering the web of factors that can contribute to disease.

Consider both the community and the individual.

Community role - for example, prevention, or intervention following a crisis; support restricting behaviors such as tobacco use through policies and programs at the community level

Individual role - consider modifiable (changeable) and unmodifiable (unchangeable) risk factors.

Unmodifiable risk factors= factors contributing to the development of a noncommunicable disease that cannot bealtered by modifying one's behavior or environment

Modifiable risk factors = factors contributing to the development of a noncommunicable disease that can bealtered by modifying one's behavior or environment

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5.21: COMMON NONCOMMUNICABLE DISEASES - AN OVERVIEW FOR PREVENTION

In this section, you will find information about some of the most common noncommunicable diseases, which account for a great deal of the disease burden in the US and other developed countries, and increasingly so in the developing world, as well. Since the 1960's, these diseases have been a large focus of public health work. This section comes from Erin Calderone's Public Health 101 OER textbook.

For each of four disease groups -- cardiovascular disease, diabetes, cancers, and chronic lower respiratory diseases -- this section will provide recent prevalence rates in the US, leading risk factors, and examples of public health efforts for control and prevention. The public health efforts mainly focus on the inner circles of the Socio-Ecological Model, through screening, individual behavior change efforts, and affecting the microenvironments of families and workplaces. Yet some important public health efforts at the societal level (the outermost circle of the social-ecological model) also merit mention, such as,

- Reducing the use of lead and asbestos in machines and buildings, contributing to lower cancer rates, better lung health, and even improved IQ scores
- Removing transfats from much of the food supply in the US, for the improvement of cardiovascular health and reduced risks of cancer
- Decreased access to tobacco in the US, which is good for the health of heart, arteries, brain, mouth, and other organs
- Expansion of SNAP (food benefits) 2020-2025 which led to an increase (at least temporarily) in vegetable and fruit consumption, good prevention for diabetes

The information in the following pages gives a good overview of these very common diseases, along with ideas of what you can do individually, within your own family or social group, and collectively (as a community or society) to reduce rates of illness and death.

5.21.1: Cardiovascular Diseases (CVD)

5.21.1.1: Current Rates in the U.S.

5.21.1.2: Risk Factors/Protective Factors

5.21.1.3: Public Health Response

5.21.2: Diabetes

5.21.2.1: Current Rates in the U.S.

5.21.2.2: Risk Factors/Protective Factors

5.21.2.3: Public Health Response

5.21.3: Cancers

5.21.3.1: Current Rates in the U.S.

5.21.3.2: Risk Factors/Protective Factors

5.21.3.3: Public Health Response

5.21.4: Chronic Lower Respiratory Diseases

5.21.4.1: Current Rates in the U.S.

5.21.4.2: Risk Factors/Protective Factors

5.21.4.3: Public Health Response

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5.21.1: CARDIOVASCULAR DISEASES (CVD)

The cardiovascular system includes the heart, blood vessels, and blood, so any diseases that affect these structures are collectively referred to as cardiovascular diseases (CVD). The most common type of CVD is coronary artery disease, which affects the blood vessels that supply the heart muscle itself (coronary arteries). However, hypertension, stroke, heart failure, and peripheral vascular disease are also included, and can often be co-morbidities (when multiple conditions are present at the same time).

Although CVD may have genetic and biological risk factors, they are highly influenced by lifestyle behaviors and environment. The most common types of cardiovascular diseases are chronic diseases, which can begin the disease process as early as childhood and progress over several decades. The disease process is characterized by changes in the arteries: atherosclerosis and arteriosclerosis.

Arteriosclerosis refers to the hardening and thickening of the arteries. Healthy arteries are elastic, and expand with each heartbeat that pumps a wave of blood flow through them. Chronic inflammation, smoking, diabetes and hypertension (high blood pressure), along with some genetic factors, can cause arteries to become calcified and/or develop fibrous tissue scars that decrease their elasticity. The arteries become stiffer and more resistant to blood flow, which in turn increases blood pressure and makes the heart have to work harder.

Atherosclerosis is a specific type of arteriosclerosis that occurs when fat deposits in the muscular walls of the arteries. These can start with fatty streaks and eventually turn into hard plaques. Arteries can get damaged from hypertension, smoking, and chronic inflammation. Low density lipoprotein (LDL cholesterol) is one way that fat is transported in the bloodstream, and tends to get “stuck” in these damaged areas in the arteries. The body will respond by creating a fibrous scar tissue over the top of the plaque - but over time the plaque can protrude into the artery, restricting blood flow.

Arteriosclerosis can progress over time to the point of causing other problems in the cardiovascular system. Blockages in the coronary arteries can decrease blood flow to the heart muscle (myocardium), called myocardial ischemia. This lack of blood flow can cause chest pain (angina pectoris), particularly when the body is under stress. Eventually this reduction in blood flow to the myocardium can cause those cells to stop contracting - which causes a heart attack or myocardial infarction. Or, if the blood vessels become weakened, they can bulge and/or burst, causing an aneurysm. These conditions can also occur in blood vessels that feed the brain tissue, causing a stroke or transient ischemic attack (mini-stroke).

5.21.1.1: Current Rates in the U.S.

5.21.1.2: Risk Factors/Protective Factors

5.21.1.3: Public Health Response

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5.21.1.1: Current Rates in the U.S.

- Mortality:
  - Approximately 919,032 Americans died from CVD in 2023 - approximately ⅓ of the deaths recorded (CDC, 2025b).
  - Although CVD is the leading cause of death for all racial and ethnic groups, the highest percentages of deaths caused by CVD are found in Black Americans (22.6%) (CDC, 2025b).
- Morbidity:
  - It is estimated that 5% of American adults currently have coronary artery disease (CDC, 2025b).
  - Someone in the U.S. has a heart attack about every 40 seconds (CDC, 2025b).

The good news is that heart disease mortality has decreased since the 1970s, likely due to advances in medicine and other public health efforts to manage risk factors like smoking and high blood pressure. People are living longer after one or more heart attacks. Still, other types of heart disease like heart failure and arrhythmias are claiming more lives (King et al., 2025).

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5.21.1.2: Risk Factors/Protective Factors

The American Heart Association has compiled evidence-based metrics for cardiovascular health (CVH) into 8 different categories they call “Life’s Essential 8”. Ideal cardiovascular health includes:

- Nutrition: eating in a pattern close to the Dietary Approaches to Stop Hypertension (DASH) recommendations or a Mediterranean diet
- Physical Activity: achieving the CDC recommended minimum amount of physical activity for adults each week - 150 minutes of moderate physical activity, or 75 minutes of vigorous physical activity, or some combination. (The recommendations now also include two days of muscle strengthening activities).
- Smoking: avoiding exposure to tobacco smoke whether it be firsthand or secondhand.
- Sleep: getting at least 7 hours of sleep per night.
- Body weight: not being in the overweight or obese categories for body mass index (BMI).
- Blood lipids: keeping total cholesterol, LDL cholesterol and triglycerides low, while maintaining healthy levels of HDl cholesterol.
- Blood glucose: maintaining a healthy blood sugar level as measured by fasting blood glucose or A1C.
- Blood pressure: maintaining a healthy resting blood pressure reading of below 120/80 mmHg.

Conversely, smoking, obesity, sedentarism, poor nutrition, a consistent lack of sleep (and resulting elevated chronic stress), hypertension, diabetes and pre-diabetes, and high cholesterol are all risk factors for cardiovascular disease. Each of these health behaviors and factors is independently associated with an increased risk of cardiovascular disease, even though the behaviors and factors can be related. Several different types of research have shown that a low to moderate level of cardiovascular health as measured by these “Life’s Essential 8” contribute to 70% of CVD events, and maintaining high levels of CVH over time decreases lifetime risks of various cardiovascular diseases - perhaps even prolonging life by 4-5 years. A high level of CVH during pregnancy was also correlated with better cardiovascular health of the kids years later. The benefits of “Life’s Essential 8” are similar across all race and ethnicity demographics, yet it should also be recognized that the social determinants of health contribute to disparities in CVH measures and the likelihood of achieving these protective factors (Tsao et al., 2023).

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5.21.1.3: Public Health Response

Improving cardiovascular health by the “Life’s Essential 8” metrics is one of the objectives of Healthy People 2030, along with several other related objectives. Most of the objectives related to heart disease and stroke are at baseline levels or have little to no detectable change at this point in time. One of these objectives is to increase the control of high blood pressure in adults. According to the new standards for healthy blood pressure set in 2017, only 16.1% of people who have been diagnosed with hypertension have it under control. Addressing hypertension in Americans would not only have positive effects on CVH, but would also reduce the risk of other diseases and conditions like kidney diseases, pregnancy complications, and more (*Heart Disease and Stroke - Healthy People 2030*, n.d.).

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5.21.2: DIABETES

Diabetes mellitus refers to the body's inability to manage blood sugar (glucose), which results in chronically high blood glucose, or hyperglycemia. There are different types of diabetes depending on the origin and progression of the disease, however all types have something to do with the secretion or action of insulin.

In healthy conditions, the body has a consistent hormonal mechanism for managing blood sugar homeostasis (normal, resting levels). The pancreas produces two hormones: insulin and glucagon, with opposing functions. When a person eats a meal with any amount of carbohydrates, these are broken down in the digestive system to the simplest sugar: glucose, and then released into the bloodstream. This causes the blood glucose levels to rise, and in response, the pancreas releases insulin. Insulin signals to the body's cells to take up glucose, thus bringing the blood glucose levels back down to resting levels. All of the body's cells have receptors for insulin, and glucose can be taken up and used for energy, or stored as glycogen or within triglycerides (fat storage). Conversely, if blood glucose levels drop - such as with fasting or exercise - the pancreas will release glucagon, which signals to the liver to break down more of its stored glycogen and release it as glucose into the bloodstream.

Type I diabetes is classified as an autoimmune disorder, in which the body's immune system attacks and destroys the beta cells in the pancreas that produce insulin. Since the body is unable to produce adequate insulin (insulin insufficiency), hyperglycemia results and the body's cells are unable to use glucose for energy. This can result in symptoms like unintentional weight loss and low energy, and sometimes ketoacidosis - or the overproduction of ketones - which is a byproduct of the liver breaking down fat for energy and can cause weakness, vomiting, excessive thirst and urination (CDC, 2021). Type I diabetes is usually identified in children and adolescents, however some adults may be diagnosed with a latent form of type I diabetes as well. About 5-10% of people with diabetes have type I (ElSayed et al., 2022).

Type II diabetes is thought to progress from insulin resistance in the body's cells. Obesity is closely associated with insulin resistance, along with some genetic and immune factors that may be interrelated. Although there are likely several mechanisms in this relationship between obesity and diabetes, one of them seems to be that high levels of fat stored in adipose tissue tends to increase chronic levels of inflammation throughout the body, and this inflammation then decreases sensitivity to insulin. If the body's cells are resistant to the insulin being produced, the pancreas creates more - causing hyperinsulinemia. Eventually, the beta cells in the pancreas may also become damaged (perhaps also due to chronic inflammation), and insulin insufficiency may result (Rohm et al., 2022). Type II diabetes accounts for 90-95% of all diabetes cases (ElSayed et al., 2022). Pre-diabetes can be diagnosed as the early stages of this process, where blood glucose is slightly higher than normal, and can also be reversed with lifestyle interventions such as nutrition, exercise, and weight management.

Gestational diabetes is similar to type II diabetes in that it is characterized by insulin resistance - this time thought to be caused by pregnancy hormones. Obesity and a family history of type II diabetes certainly increase the risk of gestational diabetes. Most cases of gestational diabetes resolve after the pregnancy is over, however there may be an increased risk of developing type II diabetes in the future (ElSayed et al., 2022).

5.21.2.1: Current Rates in the U.S.

5.21.2.2: Risk Factors/Protective Factors

5.21.2.3: Public Health Response

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5.21.2.1: Current Rates in the U.S.

- Prevalence: In 2021, it is estimated that 38.4 million Americans (11.6%) have diabetes, and almost 98 million (38%) had prediabetes (CDC, 2023j).
- Incidence: About 1.2 million people are diagnosed with diabetes each year.
- Diabetes was the 8th leading cause of death in 2021.
- Rates of diabetes in adults vary by race/ethnicity:
  - Alaska Native/American Indian (13.6%)
  - non-Hispanic Black (12.1%)
  - Hispanic (11.7%)
  - Asian (9.1%)
  - non-Hispanic White (6.9%) (American Diabetes Association, 2023).

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5.21.2.2: Risk Factors/Protective Factors

Risk factors for diabetes may include biological or disease factors outside of a person's control such as:

- Age (the risk of type II diabetes increases with age)
- Genetics (as in monogenic diabetes syndromes)
- Other diseases (cystic fibrosis, polycystic ovarian syndrome, pancreatitis)
- Treatments for other diseases (such as medicines for HIV) (ElSayed et al., 2022)

Particularly for type II diabetes however, there are several risk factors that are related to lifestyle behaviors:

- Obesity
- Poor nutrition (overconsumption of calories)
- Lack of physical activity

Conversely, protective factors against type II diabetes, and strategies used to reverse prediabetes include nutrition, exercise, and weight loss (if obesity is a factor). Exercise alone can increase insulin sensitivity both acutely and over the long term. When skeletal muscles contract, they have an "insulin-like effect" which draws glucose into the muscle cell, while becoming more sensitized to any existing insulin in the bloodstream. This allows them to take up glucose to use for the energy they need. Insulin sensitivity is increased for at least 16 hours after a workout, and if a person exercises regularly (and perhaps also decreases body fat) this can have lasting effects on their ability to manage blood sugar. Physical activity can also reduce the chronic inflammation associated with type II diabetes, and helps those with type I diabetes also manage the disease (Venkatasamy et al., 2013). For people who have obesity, losing just 5-7% of their body weight and getting 150 minutes of moderate physical activity per week reduces the risk of type II diabetes by 58%-71% (CDC, 2023b).

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5.21.2.3: Public Health Response

In 2010 the CDC created a National Diabetes Prevention Program (NDPP) to help address prediabetes and prevent type II diabetes. The NDPP utilizes public-private partnerships to provide access to lifestyle change programs for anyone diagnosed with prediabetes. Private companies and community organizations can become a Lifestyle Change Program Provider, and equip lifestyle coaches with toolkits and resources developed by the CDC. These lifestyle coaches can then work with folks who have been diagnosed with prediabetes to help them develop and maintain healthy nutrition, physical activity, and weight management behaviors. These programs can often qualify for cost coverage through federal (Medicare and Medicaid in some states) and/or employer-sponsored health insurance programs (CDC, 2016). Initial research comparing the DPP to a drug intervention (metformin) or placebo indicated that the lifestyle interventions of the DPP (targeting weight loss of about 5-7% of body weight for those with obesity) lowered the risk of developing type II diabetes by 58% compared to placebo, while the metformin group lowered their risk by 31% compared to placebo. Subsequent follow-ups 10 and 15 years later suggested a smaller, but still substantial reduction in risk (NIDDK, 2021). While more recent pharmaceuticals have been developed and shown even greater possibilities for preventing and treating type II diabetes, lifestyle interventions like supervised exercise are still important to help maintain weight loss and support healthy physiological function (Jensen et al., 2024).



Figure 5.21.2.3.1: This image depicts a man with diabetes in the background, listening to a community health worker, familiar with the necessary proactive approach one must implement in order to maintain control over the detrimental effects of this disease. The health worker was providing answers to questions posed by the patient regarding actions he would need to take, enabling him to lead a healthy, active life with diabetes. She was referencing a spiral bound manual created by the Centers for Disease Control and Prevention entitled, “Controle Su Diabetes”, which translated into English means, “Control Your Diabetes”. (Copyright; CC0, CDC/Amanda Mills)

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5.21.3: CANCERS

Cancer refers to a type of disease characterized by the uncontrollable growth and spread of cells that serve no physiological function in the body. Healthy cells have a predictable number of divisions they can undergo to make new cells before they program their own death (cell apoptosis). Cancerous cells have genetic mutations and/or epigenetic changes that cause excessive reproduction and prevent their programmed destruction. These cells can form solid clumps, called neoplasms or tumors. Cancers as a group are often referred to as malignant neoplasms in epidemiology.

Tumors or neoplasms are clumps of cells that serve no physiological function, and can start invading nearby tissues or putting pressure on other bodily structures. **Benign** tumors are not cancerous - they are much slower-growing and don't tend to spread. However, benign tumors can still cause problems if they begin to put pressure on nearby physiological structures. **Malignant** tumors are cancerous: they grow more rapidly, grow their own network of blood vessels to bring them nutrients, and invade nearby connective tissues and lymph nodes. Cancerous cells also break free from the neoplasm and spread through the lymphatic system or bloodstream to other parts of the body - a process called **metastasis**. Some cancers have no solid tumors to begin with, but instead these malignant cells proliferate in the bloodstream or lymph system. Although cancers have these common characteristics, each cancer is a separate disease, named by the tissue and organ the cells originated in (*What Is Cancer?*, 2022). Different cancers have varied causes, risk factors, and treatments.

5.21.3.1: Current Rates in the U.S.

5.21.3.2: Risk Factors/Protective Factors

5.21.3.3: Public Health Response

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5.21.3.1: Current Rates in the U.S.

- Morbidity:
  - Incidence: Over 2 million new cases of cancer will have been diagnosed in 2025.
  - Breast cancer in women has the highest number of new cases at over 316,000. Prostate cancer in men is not far behind, and lung and bronchus cancer comes in second for both sexes.
  - The lifetime probability of developing any cancer is nearly 40% (Siegel et al., 2025).
- Mortality:
  - In 2025, over 618,000 people will have died from cancer.
  - Lung/bronchial cancer is the deadliest type, causing over 20% of all cancer deaths. Breast cancer in women and prostate cancer in men cause the second most deaths, while pancreatic and colorectal cancer are not far behind for both sexes (Siegel et al., 2025).
  - Since the mid 1980's, cancer has caused a higher percentage of deaths for people under the age of 65 than heart disease (National Cancer Institute , n.d.).
  - Cancer death rates have dropped by 33% between 1991 and 2020, largely due to reductions in smoking, earlier detection, and medical advances in treatment (American Association for Cancer Research, 2023).

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5.21.3.2: Risk Factors/Protective Factors

Risk factors for cancers vary widely. Specific biological factors can put a person at risk for developing cancer, such as previous infections or treatment with specific drugs or radiation therapy, hormonal influences, and inherited genetic factors. Some of the most common biological factors include (but are not limited to):

- Specific genes (examples):
  - Inherited mutations on either BRCA1 and BRCA2 genes can increase the risk of breast cancer by up to 72% and the risk of ovarian cancer by up to 44% (National Cancer Institute, 2020). See Figure 7.3 below.
  - Mutation on the KRAS gene, which changes the proteins produced within the cell, causing it to grow uncontrollably (National Cancer Institute, 2022).
  - Lynch syndrome, which is when a mismatch repair is inherited on one or more specific genes that increases the risk of colorectal cancer by 40-70% (Imyanitov et al., 2023).

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  - Lynch syndrome, which is when a mismatch repair is inherited on one or more specific genes that increases the risk of colorectal cancer by 40-70% (Imyanitov et al., 2023).

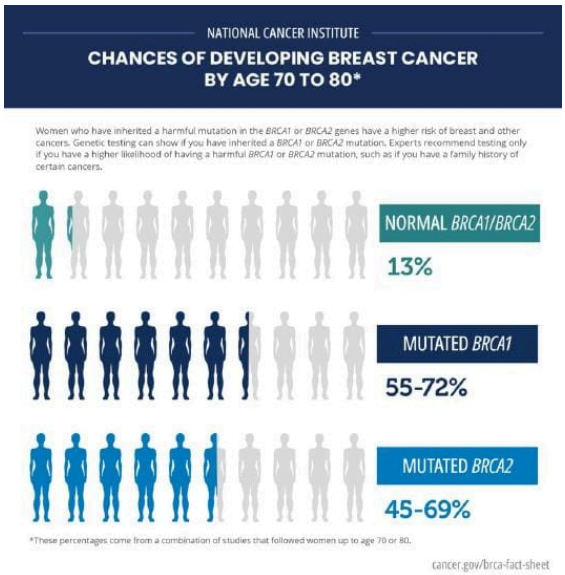


Figure 5.21.3.2.1: Chances of Developing Breast Cancer by Age 70 to 80. Specific inherited mutations in the BRCA1 and BRCA2 genes increase the risk of breast and ovarian cancers. . (Copyright; CC0, *National Cancer Institute, 2020*)

Several pathogens are also known to cause cancers. These include:

- Human Papillomavirus (HPV) is most known for its relation to cervical cancer, but it also increases the risk of cancers in both female and male reproductive systems, as well as head and neck cancers.
- *Helicibactor pylori is indicated in stomach cancers and non-Hodgkin Lymphoma.*
- Epstein-Barr virus increases the risk of Hodgkin and some non-Hodgkin Lymphomas, as well as nasopharyngeal cancer.
- Hepatitis B and C increase the risks for liver cancer and others (American Association for Cancer Research, 2023).

Epigenetic changes refer to alterations outside of DNA, which can cause changes to the way the cell functions, but may be reversible. Exposures to certain toxins can cause epigenetic changes which cause cancer (National Cancer Institute, 2022). Any substance that can cause mutations in cellular DNA is called a mutagen, and any substance that is known to cause those mutations that lead to cancer is called a carcinogen. Carcinogens are usually studied in lab animals and then confirmed with epidemiological studies. The International Agency for Research on Cancer (IARC, a division of the WHO) maintains lists of possible, probable, and known carcinogenic substances or environmental exposures as research identifies them. Three levels of carcinogenicity are described in their regular publications (called Monographs), outlining the scientific evidence for each hazardous exposure:

1. Carcinogenic to humans

2a. Probably carcinogenic

2b. Possibly carcinogenic

3. Not classifiable as to its carcinogenicity in humans

Additionally, the CDC, NIH, and FDA collaborate on the National Toxicology Program (NTP) and release updated lists of known or reasonably anticipated carcinogens every few years. However, just because someone is exposed to a particular carcinogen does not guarantee that they will get cancer. Some carcinogens are hazardous even at low doses or for a short period of time, while others affect humans after repeated exposures of long durations (American Cancer Society, 2019).

Probably one of the most well known carcinogens is tobacco smoke. Smoking is a factor in nearly 20% of all cancer cases - including lung cancer and 17 others. Exposure to tobacco smoke increases the risk of kidney and bladder cancer, leukemia, female reproductive cancers, cancers of the head and neck, and cancers of the digestive tract. Nearly 30% of all cancer deaths can be attributed to tobacco products as well (American Association for Cancer Research, 2023). Environmental exposures to radiation (including UV radiation and skin cancer), toxic chemicals (such as asbestos and lead), or pollutants (such as particulate matter in the air we breathe) are also a significant risk. Many jobs have high levels of exposures to carcinogens. Firefighters, for example, are exposed to high levels of toxins from burning plastics and synthetic materials. These exposures can increase their risk of several different types of cancers over their lifetime (American Association for Cancer Research, 2023).

About 20% of all cancers are also related to just 4 lifestyle behaviors: alcohol consumption, nutrition, physical activity, and weight management. Obesity - particularly abdominal (visceral) obesity, is associated with chronic inflammation, prediabetes, and changes in sex hormones - all of which can increase the risk of cancer. Overweight and obesity are linked to 15 different types of cancer, and may be to blame for the rise in colorectal cancer seen in young people (under 50 years old) in the past decade (American Association for Cancer Research, 2023). For an infographic on obesity and cancer, see Fig. 5.21.3.2.2 below.

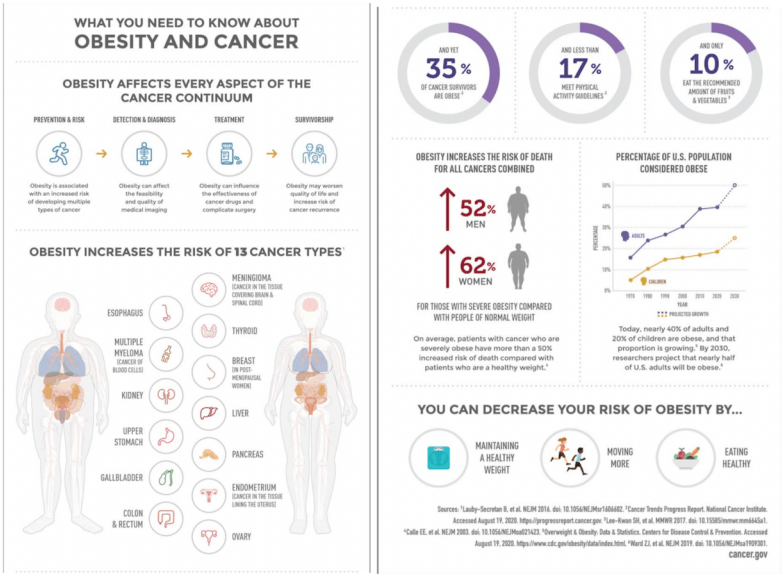


Figure 5.21.3.2.2: What You Need to Know About Obesity and Cancer. (Copyright; CC0, *National Cancer Institute, 2020*)

Conversely, physical activity can decrease the risk of at least 9 cancers, with likely protection for more as well. It is estimated

that over 46,000 cancer cases could be prevented if people engaged in the minimum physical activity guidelines of getting 150 minutes of moderate activity, plus 2 days of muscle strengthening exercises per week. Currently, less than ¼ of American adults meet this minimum (American Association for Cancer Research, 2023).

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5.21.3.3: Public Health Response

Public health efforts to reduce smoking may have had the most significant effect on cancer rates in the past decade. Between 2005 and 2021 smoking rates decreased from 20.9% to 11.9% of adults (CDC, 2023g). In 2012, the CDC launched the first federally funded anti-smoking campaign called *Tips from Former Smokers (Tips)*, which included stories from people suffering the effects of smoking-related diseases. Between 2012 and 2018, over 16 million people reported attempting to quit, and 1 million people did so successfully due to exposure to *Tips* messaging. It is estimated that this campaign helped prevent 129,000 early deaths (CDCTobaccoFree, 2024). The Office on Smoking and Health (OSH) is a division of the CDC which supports national and statewide tobacco use prevention through surveillance and promoting tobacco control programs and policies. And smoke-free policies have been demonstrated to have positive health outcomes - even acutely. In a county in Colorado, a smoke-free policy in 2006 was associated with a 23% drop in ambulance calls (CDC, 2021a). Perhaps one day, tobacco sales may be banned altogether. A recent bill in the U.K. was proposed to phase out smoking in the next generation. Smoking itself would not be criminalized, but the sale of tobacco products would be banned to anyone born after 2009. Similar legislation in New Zealand was just repealed in early 2024, so laws like this may face staunch resistance - at least initially (Reuters, 2024).

Other public health efforts have focused on increasing screening rates and vaccine uptake. Mailing self-collection sample kits for colon or cervical cancers, and using online resources like educational videos and telemedicine has been shown to increase screening rates for some of the most common cancers (American Association for Cancer Research, 2023). The HPV vaccine can prevent 80-90% of infections that cause cervical cancer, and many other cancers as well (National Cancer Institute, 2021). In 2021, 58% of 13-15 year olds had received the vaccine series (up from 48% in 20180), and the Healthy People initiative has set a target of 80% by 2030 (U.S. Department of Health and Human Services, n.d.). Some public health programs are working with pediatrician networks in order to increase doctor education, help overcome parent hesitancy, and use technology to remind both doctors and patients of the importance of HPV vaccines (Vernon et al., 2020).

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5.21.4: CHRONIC LOWER RESPIRATORY DISEASES

Also referred to as chronic obstructive pulmonary diseases (COPD), this category includes emphysema, chronic bronchitis, and other chronic lower respiratory diseases (except asthma). Although this is currently the 6th leading cause of death for Americans behind heart disease, stroke, cancer, COVID-19 and accidents, it still is a significant group of diseases that contributes to both disability and mortality. These diseases affect the lungs and bronchi; causing inflammation, reducing elasticity and oxygen exchange within the air sacs (alveoli), and creating more mucus and phlegm. This causes coughing, wheezing, and trouble breathing - limiting the amount of activity that the person can do. COPD is progressive, meaning it gets worse over time (National Heart, Lung, and Blood Institute, 2023).

5.21.4.1: Current Rates in the U.S.

5.21.4.2: Risk Factors/Protective Factors

5.21.4.3: Public Health Response

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5.21.4.1: Current Rates in the U.S.

Prevalence:

- In 2022, 4.6% of Americans were living with COPD, emphysema, or chronic bronchitis. This percentage has not changed significantly since 2019 (*FastStats*, 2024).
- The age-adjusted prevalence of COPD has hovered at around 6%, and has not changed significantly between 2011 to 2022 (*National Trends - Chronic Obstructive Pulmonary Disease (COPD)*, 2024).

Mortality:

- Over 142,000 people died from COPD (including asthma) in 2021, putting the mortality rate at 42.9 per 100,000 people (*FastStats*, 2024).

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5.21.4.2: Risk Factors/Protective Factors

The primary risk factor for COPD is cigarette smoking. Most people who develop COPD are current or former smokers (National Heart, Lung, and Blood Institute, 2023). However, a rare genetic condition called Alpha-1 antitrypsin (AAT) deficiency can cause asthma and COPD, and is a cause of about 5% of COPD cases (Brode et al., 2012). Other environmental or occupational exposures to secondhand smoke, air pollution, chemical fumes, or smoke from cooking can all damage the lungs. Most people who develop COPD are over the age of 40 (National Heart, Lung, and Blood Institute, 2023a).

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5.21.4.3: Public Health Response

The public health response to COPD is likely tied into other prevention efforts, such as anti-smoking campaigns. (See Cancer above).

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5.23: Additional References - if not cited on page itself

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6: COMMUNITY ORGANIZING, COMMUNITY BUILDING, AND HEALTH PROMOTION

Community organizing and **community building** are processes by which community members come together to address a shared problem or opportunity, using one of several approaches to attain a change in their shared environment. **Health promotion** is a similar approach, usually initiated by health educators, to foster individual behavior change and changes in the local environment.

A famous graphic depicts a community of "little fish" coming together to challenge a "big fish" -- how do you think it relates to this chapter's topic?



Figure 6.1:Common organizing meme. (CCO license; via https://svgsilh.com/)

6.1: Learning Outcomes
6.2: The Community as the Client
6.3: What Is Community Organizing?
6.4: Organizing steps in a campaign for change
6.5: Required Video Case Studies
6.6: More Examples of Organizing
6.7: Environmental Justice
6.8: Why community organizing for public health?
6.9: Applying the Roles of the CHW to a Case Study
6.10: Community Intervention Models
6.11: Health Promotion Programs
6.12: How to create a health promotion program
6.13: Case Study 2- Our Choice/Nuestra Opción- The Imperial County, California, Childhood Obesity Research Demonstration Study (CA-CORD)
6.14: Lessons from Geese
6.15: Additional Resources

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6.1: Learning Outcomes



By the end of this Chapter, you will be able to

1. Define community organizing, community capacity, community participation, community building and empowered community.
2. Distinguish between community organizing approaches that emphasize conflict (an adversarial relationship to power) and community building approaches that emphasize consensus (a collaborative relationship to power).
3. Identify the assumptions that underlie the process of community organization.
4. Briefly explain the differences among "planning and policy practice," "community capacity development/capacity building," and "social advocacy/social action" -- all strategies for community organization.
5. Distinguish needs-based and strengths-based community organizing models, and discuss the difference.
6. List the steps for a generalized model for community organizing/building.
7. Describe some common tools or tactics for community organizing.
8. Discuss at least one case study of community organizing for health.
9. Summarize the steps involved in creating a health promotion program.
10. Define and describe "needs assessment".
11. Distinguish between goals and objectives in planning a health promotion program.

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6.2: The Community as the Client

On this page, adapted from a community nursing textbook, we examine some of the definitions and assumptions about the community as the focus of a public health project. As we discussed in Chapter 1, public health differs from medicine or personal health in its focus on a population. In organizing efforts, that population is a community. Please note: While nearly everything on this page comes from the community nursing textbook, in some places the term "nursing" was changed to "public health" or "nurse" to "public health worker," where that change could broaden the meaning without diluting it.

Broadly, a community is defined as a group of people with at least one characteristic in common. The characteristic may be a place, a personal attribute, or a common goal. In each community, there are individuals with health problems and health risks, some of which may be individual, meaning the rest of the community does not face similar circumstances. For example, a person who smokes or lives in a home with smokers faces increased respiratory health risks compared to a person who does not smoke or live with smokers. A person who does not wear sunscreen has an increased risk of skin cancer compared to a person who applies sunscreen daily. However, every community may house a common health condition or shared health risk. For example, a community situated near a factory that disposes of its toxic chemicals in the water supply shares the risks of consuming contaminated drinking water. Similarly, residents of a city that provides automated external defibrillators (AEDs) in high-traffic public places may have a better chance of surviving a cardiac event than those with no accessible AEDs.

In population- or community-based nursing, nurses work to address a community's collective health instead of individual health needs. Public health nurses are an important part of the public health workforce, and they often work in conjunction with community health workers, health educators, and others.

Community Attributes

Formal and informal communities exist within and across towns and cities. A community may comprise people who celebrate the same cultural holidays or people who are at risk for the same health condition.

Consider the many communities that may be present in a classroom of students: a community of students, a clinical team, a study group, students with children, and perhaps students studying for a new career. Likewise, local communities may consist of those who inhabit a specific geographic location, share specific characteristics, or access the same social systems. Communities may also form when groups cannot access select health services and social systems.

Individuals do not have to live within mapped boundaries to be part of a geographic community. People who work, worship, or play in an area where they do not live can be interested in that community's health.

A key activity for geographic communities is civic engagement—involvement in issues of public concern through political and nonpolitical processes that increase community vitality, challenge injustices, and address social problems (Figure 16.2) (American Psychological Association, 2009; Wray-Lake & Abrams, 2020). Other geographically based communities include members of community centers, such as a Council on Aging or a Boys and Girls Club, and populations of school students, home caregivers, and teachers in a geographic community.



Figure 16.2 Protest is a form of civic engagement. Protests can inform members of the public of issues, mobilize voters and community members to act for change, and influence the policy process. Here, people are voicing their opinion on the need to address climate change during a climate strike rally in 2019. (credit: "#ClimateStrike Rally" by MN Senate DFL/Flickr, Public Domain)

Healthy People 2030: Civic Participation

Social determinants of health and civic engagement are closely linked. Healthy People 2030 identifies voting, volunteering, participating in group activities and activities such as community gardening, and participating in a recreational sports team as methods of civic participation. Such activities can benefit the health of individuals and populations. Healthy People 2030 aims to increase the proportion of voting-age citizens who vote and increase knowledge of civic activities or interventions that may ameliorate health disparities.

People who share personal characteristics such as race, ethnicity, gender, age, or occupation may create a formal community for mutual support or to advance equitable practices across health care and other fields. Others who share such characteristics may not participate in a formal community but may informally associate with members of the community, remain knowledgeable of the shared successes and challenges the community faces, and advocate for change. Populations of individuals who share health risks may also constitute a community.

Social Media and Other Social Systems

Social media and other social systems provide avenues for the formation and definition of communities. Social and political networks may serve as a basis for uniting as a community for health change. Technology has dramatically enhanced opportunities to join a community, as many people use social networks to participate in civic engagement, learn about health, effect change through sharing stories and knowledge, and organize to advocate for policies and societal changes that advance health. Social media has increased the visibility of community health issues, as community members and advocates can quickly share information with people around the globe.

Advocacy in the context of community health refers to support for a specific health cause or recommendations for community and policy change. Advocacy is a significant health promotion strategy to inform voters and policymakers of pressing community health issues and the consequences of harmful policies or inaction (Jackson et al., 2021). Community members who share their own health experiences encourage the forming of community, as other members who identify with the experiences or want to support health change can join the conversation and become involved. Social media has provided a platform for community members, clinicians, organizations, charities, and others to connect and work together to improve the dimensions of community health in many areas. Health advocates have used social media to call attention to, and impact change for, many issues across the globe, such as alcohol use in the Netherlands, tobacco control in Australia, sexual harassment in Egypt, traffic accidents in Ireland, maternal mortality in the United States, and housing in New Zealand (Albalawi & Sixsmith, 2015; Behm et al., 2022; Bekkers et al., 2011; Chisholm & O'Sullivan, 2017; Hefler et al., 2013; Peuchaud, 2014).

Social Media and Community Health Change

Communities have worked to generate health change through social media messaging and campaigns. Over the last few years, many social media movements have raised awareness of select health issues, changed public perception of health problems, and even successfully advocated for policy change in companies and organizations or for greater society through changes to public law. For example, the #MeToo movement that went viral in 2017 contributed to the U.S. Congress passing of the Sexual Assault Survivors' Bill of Rights.

Optional activity: Using the social media platform of your choice, explore one of the hashtags below, and then respond to the questions that follow.

- #BlackBreastfeedingWeek
- #TransHealthMatters
- #ReclaimingMySize
- #NativeHealthMatters
- #NothingAboutUsWithoutUs
- #MentalHealthAwareness
- #NotJustSkinDeep
- #WomensHealthMatters
- #EveryBodyHasAStory
- #MedicareForAll
- #BlackLivesMatter
- #ThisIsEndometriosis
- #GirlsCount
- #HIVNotRetro
- #FarmworkersFeedUs
- #TransLivesMatter
- #HealthEquityNow
- #QueerAndDisabled
- #HealthForAll
- #BreakTheStigma
- #BlackHealthMatters
- #SaludLatinx

1. What is the health message or health change that users of the hashtag hope to make?
2. What are the characteristics of community members amplifying the health message? Are any voices being amplified that would be silenced without social media?
3. Since the implementation of the hashtag, has any health change occurred? Think about health change locally, statewide, and nationally.

Community Assessments and Profiles

Assessment is the first and most important step of the nursing process, and this is something it shares with community organizing. Nurses and other public health workers cannot address a problem if they do not know it exists, and they cannot support a health behavior or community effort if they do not realize it is occurring. Assessment begins with gathering data, which can happen using several approaches. First, they may conduct a windshield survey. In a windshield survey, nurses (or others) explore a community or neighborhood and observe on foot, from a bench or street corner, or through the windows of a vehicle (Centers for Disease Control and Prevention, 2010). Observations made using this type of survey can alert nurses to urgent or potential health risks in the community, as observers may notice the condition of sidewalks and public spaces, community noise levels, street access and activity, and the presence or absence of businesses and places of employment. Per the University of Kansas Center for Community Health and Development Community Tool Box (2023), a walking or windshield survey includes the following observations:

- Housing: age and condition of homes in the neighborhood
- Other buildings: occupancy and accessibility of buildings
- Public spaces: availability of places to gather and their amenities, upkeep, and utilization

- Parks: utilization, times of use, activities facilitated
- Culture and entertainment: presence of museums, libraries, theaters, and sports venues and their accessibility and use by members representative of the full community
- Streetscape: condition of building facades and storefronts, presence of trees and sidewalks, cleanliness
- Street use: presence of people during various times of the day
- Commercial activity: types of businesses, storefront vacancies, stores that provide necessities like groceries
- Signs: languages, level of information
- Industry: types of industry, pollution
- Land use: open space compared to used land; distribution of residential, commercial, and industrial areas
- Infrastructure: condition of roads, bridges, and sidewalks; differences in condition across the community
- Public transportation: presence and use of system
- Traffic: level of traffic, vehicles in traffic
- Environmental quality: green space presence and distribution, air quality, water sources
- Race/ethnicity: characteristics of community, separation or cohesion of groups
- Faith communities: religious institution types and presence
- Health services: hospital and clinic presence and accessibility
- Community and public services: presence of mental health centers, food banks, and housing support and their distribution and accessibility by public transit
- Community safety: police and fire stations
- Public schools: presence of schools and their level of maintenance or upkeep
- Higher education: two- and four-year colleges, location, integration with community versus isolation
- Political activity: political signs (e.g., yard signs during elections), protests, demonstrations
- Community organizations: service clubs and other groups centered on community issues
- Media: local outlets, sponsorship/influence
- Differences among neighborhoods: states of maintenance, presence of community amenities across neighborhoods or sections
- The “feel” of the community: the observer’s overall impression of the community

Regardless of the method used to conduct a windshield survey, nurses and other public health workers should conduct the survey in pairs or groups. First, it is unsafe to attempt to drive and note observations at the same time. Additionally, each person may have different observations, which can add to the richness of data collected. Data can also be collected from open sources in the community, such as publicly available reports, census data, and other public documents (Quinn et al., 2019). For example, department of health reports regarding the rates of communicable illnesses and chronic conditions can help elucidate a community’s health needs, and the posted minutes of a local select board meeting can illuminate health topics on the minds of local community partners and residents. Finally, key community partners, policymakers, community leaders, and community members should be consulted during a community assessment.

Theory in Action: Windshield Surveys

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this YouTube Video online

These two videos were created by nursing students as they conducted their own windshield surveys. The first video displays a windshield survey of a community in Ohio with the students’ interpretation of their observations. The second video facilitates a virtual windshield survey of communities in Virginia.

Watch both videos, and then respond to the following questions.

1. How do you interpret the windshield survey of communities in Virginia?
2. What other observations would you make of the Virginia communities to prepare a community assessment like the one displayed for the Ohio community?

3. What conclusions might you draw about health and well-being in the Virginia communities based on the windshield survey?

Including community members in community-based nursing and public health work is essential and should start from the earliest stages of a community initiative. Involving community members' perspectives and participation supports not only thorough assessments and meaningful change but also ethical practice. Meaningful partnerships with community members show respect for the community, build trust and relationships, minimize risk and burden, build legitimacy, and positively impact health (Adhikari et al., 2020; Haldane et al., 2019).

Community inclusion also helps public health workers counter both the narrative and the reality that clinicians often tell people what to do without considering personal, contextual, social, or other factors. Such actions may be perceived as patronizing and marginalizing the community, or treating them as insignificant and making them feel powerless or unimportant. In nursing, decolonization refers to processes that systematically dismantle "western colonial ideologies of superiority, thought, approaches, and privilege" (Fontenot & McMurray, 2020, p. 272). Partnering with members of a community is in alignment with decolonization and can contribute to community interventions that are robust, respectful, culturally responsive, and inclusive (Lin et al., 2020; McCreedy et al., 2018).

Once data is collected, it must be analyzed and acted upon. Whether using a nursing tool like a functional health assessment (see a fuller example here on the original page on the community as client), or the social ecological model, or other tool to organize the data collected, it is important that the analysis process includes the community affected. More details on the steps of a community organizing or community building campaign, as well as several case studies of real campaigns, follow.

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6.3: What Is Community Organizing?

In *Community Organizing and Community Building for Health*, Meredith Minkler and Nina Wallerstein offer a clear definition of community organizing:

> **"Community organization is defined as the process by which community groups are helped to identify common problems or goals, mobilize resources, and develop and implement strategies for reaching the goals they collectively have set."**

Minkler and Wallerstein discuss community organizing in a health context, emphasizing empowerment, a process by which individuals or communities take control over their lives and environment. This greater control or power may take the form of greater community problem-solving ability and/or a change in their actual conditions and relations of power vis-à-vis others in their setting. It can involve developing skills for greater self-reliance, and it can involve taking on City Hall, industry, or whoever holds the power to affect the community.

Different definitions of *community* can coexist, as noted on the previous page. Community can be defined geographically (like a neighborhood), by membership in a particular demographic group (like an ethnic or religious group), or by a shared experience (for example, being a veteran).

Regardless of the community involved or the approach taken, community organizing seeks to *empower* communities.

Empowerment

Empowerment can be defined as a process by which individuals or communities take control over their lives and environment.

Approaches to Community Organizing

The processes or approaches used in community organizing also vary. One of the earliest descriptions of different processes (or approaches) was developed by Jack Rothman whose three categories of organizing include social advocacy, community capacity development, and planning & policy practice. (At least, that's how they are usually referred to these days -- his original language was slightly different.) Later researchers have used slightly different names for these 3 approaches, and have sometimes added to the list. Minkler and Wallerstein developed a typology to look at community organizing and community building on a continuum, arranged around a couple key questions.

1. Is the organizing focused on conflict / confrontation or on consensus building?
2. Does the analysis of the problem emphasize the needs that aren't being met, or the strengths that could be sharpened? (or both?)
3. Is the leadership primarily coming from community residents or from outsiders seeking to help the community?

Here's a short video explanation I made for you, outlining three main approaches to community organizing -- it may be helpful to review either before or after reading the explanation of approaches below. While I made this video in reference to the Seabert, McKenzie & Pinger textbook (listed below in the references), now the key information about community organizing approaches is all contained in this chapter.

Conflict approaches: Community organizing can take a *confrontational approach*. This assumes a conflict between those in the local society who control resources or decisions, on one hand, and the communities denied full access to those resources and decisions, on the other. A frequently cited quote from the remarkable abolitionist, intellectual and former slave Frederick Douglass reflects the tone of this tendency among community organizers: "Power concedes nothing without a demand. It never did and it never will." This approach is often called **social justice advocacy,** or **social advocacy** or Alinsky-style organizing (after Saul Alinsky, organizer and author of *Rules for Radicals).*

Social justice advocacy can be sparked by professional community organizers from outside the community (as advocated by Alinsky) or by local residents who are fed up with the status quo. Often it is a combination -- angry or distraught residents may seek the help of a professional community organizing group. Traditionally, social advocacy campaigns seek to force someone with power (like the local government, a local employer, or a utility company) to fix the problem that the community has identified.

While this focus on fixing a problem is considered a needs-based approach, it's important to note that a lot of internal community strengths are built during an organizing campiagn. When these internal strengths are a co-equal goal of the campaign -- not just changing the policy or the polluter, for example, but also changing the community's internal capacity -- then social advocacy can be considered a strengths-based approach. Minkler and Wallerstein call this "Empowerment-Oriented Social Action".

Frederick Douglass

Food for thought, in a quote from Frederick Douglass: "Those who profess to favor freedom, and yet depreciate agitation, are men who want crops without plowing up the ground."

Consensus Approaches: In contrast to the social advocacy approach, some community organizers focus more on *consensus* than conflict, and seek to build *within communities* the capacities to resolve challenges on their own. Advocates of a consensus approach often seek collaborations (rather than conflict) with other institutions. The **strengths-based community capacity development** or **community building** approach in the Robert Wood Johnson Foundation video below is an example of a campaign that focused more on consensus and capacity-building. Community building approaches generally focus less on problems (or needs) than they do the strengths of a community that can be marshalled for community improvement.

Using data from the community and working together with local government officials for new programs or policies is a third approach, which also focuses on *consensus-building*. It is often called **community development** or **planning and policy practice**. This approach often emphasizes building **social capital** both within the community (say, new connections and knowledge) and between the community and local government (or other sources of power). At one time I worked with a project that trained and mobilized Oakland youth to map the strengths and problems in their communities, then use that data to partner with the City of Oakland to use city funds to fix problems. That's a good example of a community development approach.

Here is a short video describing how the community of Houston, TX organized around two public health threats: second-hand tobacco smoke and lack of physical activity / childhood obesity. This video was made by one of their funders, the Robert Wood Johnson Foundation. There are roles for people working to support community organizing at all levels -- professionals working with foundations and nonprofits, elected government officials and their staff, and most importantly, community leaders and community members themselves.

Questions to consider in watching the video:

- How would you classify the types of organizing you see here? There may be more than one approach.
- Where do you see people seeking consensus or shared action, and where do you see them sharpening a conflict (or forcing a powerful entity to change their practices)?
- How fun do you think it would be to participate in a campaign like this? Are there parts of the campaign that especially appeal to you?

In organizing communities to grapple with health, promote prevention, uproot the causes of disease or suffering, or attain better (and fairer) treatment for the sick, there can be **no one single "right way" to organize**. In different settings and different moments, many different approaches have worked. What the approaches have in common is recognizing the value of *prevention* – creating the basic conditions for health for communities – and *equity*– increasing access to resources for all.

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RWJF video - does it need a citation?

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6.4: Organizing steps in a campaign for change

Please take a few moments consider the following steps that are likely to happen in the course of a community organizing campaign. They don't always happen in this precise order, and some campaigns skip one or more of these steps. However, as a description of some of the typical actions or phases of an organizing campaign, this is a useful template (Seabert, McKenzie, & Pinger, 2022).

Recognizing the issue

Community organizing and community building efforts -- whether based in conflict or consensus approaches -- start with naming a problem that must be solved. Often the person or people who first recognize the issue and start to take action become the initial organizers, even if others take the lead later on. Sometimes this person comes from inside the community that is affected, and sometimes they come from outside. If they come from outside, as you can imagine, they have to come in with respect!

Gaining entry into the community

If the organizer is not from the community that is affected, they often need to meet with people who are respected within the community first. These people are sometimes called **gatekeepers**. They help the newcomer understand the community, and they also help build trust in the newcomer (the organizer), if the gatekeepers support their actions.

Organizing the people

Recruiting and building a sense of cohesion among the participants in a campaign is key. These participants may be volunteers, or paid, or a combination of both. Often some training is involved. Sometimes the people are just neighbors who come together to act, forming a new loose organization. Sometimes the people are already involved in formal or informal organizations -- parent groups, soccer teams, faith communities -- and the organizing happens that way. When several organizations come together to act on an issue of common concern, it is called a coalition. Coalitions are often needed to effect any kind of lasting change.

Assessing the community

Understanding what problems and also what strengths (or assets) a community has = assessing the community. This can involve doing some research (and the groups or individuals in the organizing campaign take part in this). One approach to assessing the community is called mapping the community's capacity (see the Asset-Based Community Development or ABCD Institute for an example of this). This process helps the organizing campaign members understand the issues, identify possible allies and opponents, and start thinking about what specifically they want to ask for or demand, to solve the problem.

Determining the priorities and setting goals

Picking a goal for a campaign is much more than writing a wish list of things we would want changed. Priorities have to be set, focusing on those that the community is enthusiastic to work on. In setting a goal, here are some criteria to consider:

- It must be winnable, otherwise people will feel less empowered instead of more
- It must be simple and specific, so anyone can explain it in a sentence or two
- It must unite members of the organizing group and involve them in meaningful ways
- It should affect many people and help build up the community
- It should be part of a larger plan or strategy to enhance the community.

For this reason, sometimes the first goal is very concrete and small -- like getting speed bumps put on the street by a school. But the campaign is never just about the speed bumps! It is about people taking more power over their environment and gaining the power to influence the conditions of their lives. After winning the goal of the speed bumps, what might be the next goal?

Arriving at a solution and selecting intervention strategies

Once you have a goal set, how are you going to get there? You have to have a *solution* to put forth -- the thing you are asking for. And you need at least two types of strategies.

First, in deciding on that solution, you must weigh out what kind of strategy will best address the issue you have identified. Do you want to use a health education strategy, like having community members educate one another about healthy eating? Do you want an environmental change, like getting a polluting industry to clean up its act? Do you want a new law or policy passed, or to have an existing law enforced better? In Table 5.2 in ICPH, you will see some examples of interventions that can promote health and build community capacity.

You also need a campaign strategy! If you are engaged in a consensus-based campaign or a conflict-based campaign, your tactics might be different. Are you going to hold a protest march or a street theater activity to put pressure on local decision makers, or maybe organize a boycott? Or are you going to organize community members to attend a public meeting and offer their testimony about what's going on in the community? What kind of posters, flyers, or social media are you going to use? These are all elements of a campaign strategy and they may change often as you implement your plan and move toward your goal.

Implementing the plan

Once it is clear what intervention or change you and the community want to achieve, and you have some sense of the campaign activities you will use to get there, then the organizing team gets busy! The organizing part can involve educating the public and also local officials about the need for the solution you have chosen, and it may involve pressure tactics like protests or boycotts. It may also involve doing more research, or sitting on planning boards or testifying at public meetings, to engage with people at different levels of power in the community.

Once the solution gets adopted by whoever has the power to implement it -- within the community or at some level of government -- then the community still needs to be involved in making sure the implementation is what they expected, and giving advice on how to make it successful.

Evaluation, Maintaining, and Looping Back

These last three steps all involve looking at what has happened so far and learning from it. Evaluation can be informal, or it can be very formal like an academic research project. Evaluation is intended to see if the intervention the community selected is actually working to solve the problem they identified. (Often, evaluation also takes place along the way to see if the campaign tactics are working, or if they need to be changed in order to reach success.)

Maintaining is the step of making sure that whatever "win" the community has had, whatever intervention has been achieved, continues to work well for the community. Often a city or state agency takes on the job of monitoring if a new service continues or a new law is enforced. The community can also play a "watchdog" role, to help maintain the interventions that the community fought for.

Looping back is listed at the end of the 10 steps, but the truth is, it happens all the time. In particular, as solutions are decided on and plans are made, the organizer and the community must "loop back" to see how it is working and to make adjustments to the plan.

Community organizing and you

- What do you think you would enjoy about participating in a community organizing campaign?
- What organizing campaigns do you see in your community?
- What experiences have you or members of your family had with community organizing?

References

Seabert, D.M., McKenzie, J.F., and Pinger, R.R. (2022). *An Introduction to Community & Public Health*, 10th ed. Jones & Bartlett.

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6.5: Required Video Case Studies

Below you will find two short case studies of community organizing for health – one about Latino Health Access in Orange County, and one about anti-gentrification organizing in Northern & Southern California. (There are several additional case studies on the next page.) These two offer a nice contrast of more consensus-based organizing (Latino Health Access) and conflict-based organizing (City Rising.) They also show the breadth of health issues that an organizing campaign might address, touching on many aspects of community life.

As you watch them, ask yourself these questions:

- Which of the principles of community organizing do I see here?
- How do they encourage participation and start where the people are?
- In what ways do they use a community diagnosis or community research as a basis for action?
- In what ways do they use a consensus-based approach to organizing and/or a conflict-based approach?
- In what ways do they partner with and/or challenge institutions and governments locally?
- How do they build trust and a stronger sense of community belonging?
- How do they build power to influence what happens on the ground?

Latino Health Access

The Latino Health Access campaign uses a mix of community building approaches (developing strengths within the community) and a community development/program planning approach (partnering with local government and institutions to develop new resources in the community). They work to build consensus for change, even as they advocate for themselves. At least in these videos, we see less engagement the confrontational/conflict approaches that are typical of social advocacy organizing.

This segment of a longer documentary about obesity ("The Weight of the Nation") features the work of Latino Health Access to improve access to physical activity by creating a park in Santa Ana, CA, and through peer-to-peer outreach and education.



PLUS -- please watch this TED Talk by Dr. America Bracho of Latino Health Access, who has engaged in deep organizing for health in the Latino community in Orange County, California. While I wish her talk emphasized the community organizing aspects of the work more, I do appreciate it's emphasis on empowering residents to take action on health collectively, a key community building function.





Anti-Gentrification Organizing: City Rising

This 17-minute video features anti-gentrification and pro-housing efforts in Oakland, Los Angeles, and Long Beach, CA. The video itself is on this page from the public television channel that broadcast it (PBS SoCal). Please view the video and at least skim over the additional information on the webpage that helps contextualize these struggles historically. I can't embed the video directly here in this book, so please go to the link below to view it.

City Rising: Lessons on Community Organizing in Chicana/o-Latina/o Communities: Educate, Agitate and Organize

This supplementary case study of anti-gentrification organizing efforts in Oakland highlights the Causa Justa / Public Health partnership to look at housing and health, together with the Alameda County Public Health Department, complements this City Rising video very well. If you enjoyed the video, click on the case study for maps, charts, and additional information!

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6.6: More Examples of Organizing

In the Chapter on Social Determinants of Health (SDOH), you saw several examples of community organizing. Here are a few more -- pick one or more to view, to broaden your awareness of community organizing for health.

Heart of Access: San Franciso's Response to Covid

San Francisco had an unusual degree of community leadership and community action in response to the covid pandemic -- and it showed in our health statistics! San Francisco had the lowest covid-related death rate of any large US city, I believe. Every community in the city -- especially those neighborhoods most at risk -- played a part in saving lives and informing residents and promoting health. This documentary shows some of that work.

This documentary is 25-minutes long, but the last 5 minutes are the credits and information on local services, so it's just 20 minutes of interviews. I found it quite moving -- and I recognized several former CCSF students among the voices featured here!

To view the documentary, you have to register on this page. There is no charge -- the sign in is free. Whatever sign-in information you provide may be shared with the public health department. You don't have to watch this if you don't want to sign in -- and if you do want to sign in, I don't think you necessarily have to use your real name. I did, but how you sign in is your choice.

Link to Heart of Access documentary

Laotian Organizing Project and Asian Pacific Environmental Network

This write up (including audio interviews and one video interview) on the Laotian Organizing Project and APEN (Asian Pacific Environmental Network) also tells an important story of organizing for health.

Environmental Justice in Chester PA

This example is quite old, and I apologize for that. It is a concise description of a social advocacy campaign, one focused on sharpening the conflict and challenging the power structures, and for that reason I include it, despite being out of date.

YouTube Video

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this YouTube Video online

OPTIONAL**:** You may want to read or skim this article from PBS (NOVA show) with more recent information about environmental justice in Chester, PA.

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6.7: Environmental Justice

Environmental Justice (or EJ)

is a movement that brings together the science of environmental health with community organizing. Environmental Justice seeks to ensure that the costs of our industrial society (noise, air pollution, water pollution, etc.) do not unfairly fall in a disproportionate way on communities of color and more generally, poor and working class communities. It is both about fairness in the distribution of risk, and the reduction or elimination of sources of that risk. This movement has been around for a few decades now, and spans the globe. In 1991, a conference that brought together many groups working to address environmental racism adopted 17 core principles of environmental justice- and these principles, like the right to community self-determination and the right to a safe workplace, are still touchstones of the movement today.



Environmental health is a sub-discipline within Public Health that examines the biological, physical and chemical factors in our environment that affect health. (The next chapter of this book goes into more depth on environmental health.) Environmental health specialists work to create health-promoting environment, and try to protect people from things that make us sick, such as toxins in the air, water and soil. Environmental health emphasizes a strong foundation in science, a commitment to monitoring conditions for health, and skills for investigating the interactions among different contaminants. Looking at interactions is important because in real life, unlike in the laboratory, most toxins don't show up one by one -- a source of pollution will probably emit many different substances together.

Environmental Justice uses the science of environmental health to identify the sources of pollution and then uses community organizing to push for those polluters to do something about it.

Here are some useful definitions:

- **Spirit of Environmental Justice**: "We all have a right to a clean and safe environment where we live, work, play and go to school. " APEN
- **Environmental Justice:** Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.
- **Environmental Racism:** Whether, by conscious design or institutional neglect, actions and decisions that result in the disproportionate exposure of people of color to environmental hazards and environmental health burdens.

This short video (6 minutes) from UCLA gives several vivid examples of environmental justice organizing in Los Angeles:

YouTube Video

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this YouTube Video online

Frontline Communities

Environmental justice movements focus on the "frontline communities" that are both MOST IMPACTED by environmental racism and need to be in leadership in decisions about what to do about it. These are often communities whose residents are mainly Black, Brown, Indigenous, and other People of color. They are often poor communities. They may be rural, urban or suburban -- but wherever they are, they often don't have a lot of formal political power. But they do have **people power**. Frontline communities are using community organizing approaches to tackle environmental health problems and build health equity.

The Climate Justice Alliance, for example, highlights these principles, regarding the role of frontline communities in fighting pollution, including the "greenhouse gasses" that cause climate change.

They raise important questions about

- Who gets to tell the story? How is the story defined -- by the communities themselves, or by outside "experts" or journalists?
- Who makes the decisions? This refers to the decisions about the goals and solutions to pursue, and also the tactical decisions about how the organizing campaigns should work.
- Who benefits and how? How do we make sure that the benefits of reducing pollution or shifting away from fossil fuels actually come to the frontline communities?
- Who else is impacted -- and how can coalitions be formed?

Several of the community organizing case studies on previous pages could be seen through the lens of environmental justice. Which ones would you describe as environmental justice campaigns?

References

**Parts of this page were written by Dr. Ann Rojas-Cheatham, faculty at CCSF.

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6.8: Why community organizing for public health?

At this point, you can probably answer this question yourself! Among other reasons, please consider empowerment, participation, and effectiveness. Community organizing campaigns can be unpredictable and difficult to evaluate, as the campaign changes and evolves. However, that doesn't mean they don't show results!

Empowerment: Community organizing can address some of the underlying social determinants of health by changing unfair or unequal conditions that communities experience. This *external process of change* – as empowered group or neighborhood or community develops and uses the capacity to effect real changes in the material conditions of their lives – is accompanied by an *internal process of empowerment*. People who participate in community organizing campaigns gain a greater sense of what Len Syme called in Unnatural Causes "control of destiny" or "hope." In the complex process of embodiment, "control of destiny" is protective. To the degree that people have control and influence over the conditions of their lives, they benefit from empowerment as a buffer to stress.

Community organizing can contribute to both types of empowerment – the collective empowerment of groups *and* the psychological empowerment of individuals.



Participation: Community organizing is one way to put the "public" in public health. Public health should mean more than efforts that are FOR the public, or paid for BY the public. It would be great if more public health efforts were created WITH the public. Since public health relies on high quality science and policy measures on a broad scale, it often depends on highly-educated specialists. The broader community can sometimes be relegated to being "the target audience" of public health campaigns – those who *receive* vaccinations, or breast-feeding brochures, or lead testing. Community organizing for health enables public health professionals to *join with* community members in a deeper form of participation to transform the conditions that impact health.

Effectiveness: Community organizing can be a more effective means to solve health problems. For one thing, local communities know their issues and often know what works to transform them. It can be difficult to evaluate community organizing in a rigorous way, because the campaign shifts in ways no evaluator could anticipate.. However, community organizing can often lead to more effective solutions, ones the community can actually use -- just think about the case study about building the park in Santa Ana, in an organizing effort led by Latino Health Access.

Flexibility required!
Staying flexible and responding to the situation as it evolves is a key skill for community organizers! This flexibility can lead to more creativity and new approaches.

Benefits and challenges of community organizing for health, as shown in research

A recent research paper (Jimenez & Heller, 2025) offered a detailed answer to the question, why community organizing for health? The authors reviewed 24 published research reports on community organizing for health, most of which addressed structural factors influencing health. The organizing efforts studied addressed many different issues, from substance abuse to chronic disease to migrant health, with environmental justice being the most common focus. In about half of the efforts, public health agencies partnered with community organizations, and in the other half, the public health agency worked with the community on its own.

The key benefits to community organizing for health noted in this review paper included:

1. Increased public health effectiveness: The organizing fostered more response to the community's needs, improved trust in public health, improved health outcomes, and better access to health information among community members.
2. Set or changed priorities: The organizing influenced the priorities of public health agencies in terms of resources, research, and advocacy, to more closely align to community members' priorities
3. Built community power: Communities increased their power through developing transformative narratives, working collectively, and getting public health agencies and researchers to share their power with communities.
4. Enhanced data collection and research: Research quality was enhanced through improved trust and ethics, greater recruitment of community members, and more validity of the data about health equity, through community organizing and partnerships.
5. Policy changes: Actual changes in policies that enhanced health equity were achieved through the organizing efforts, including improved access to healthcare, better food environments, housing initiatives, transit changes, and the prohibition of landfill expansion.
6. Built community capacity: Community capacity was built through leadership development and critical analysis skills and advocacy.
7. Increased social capital: Social capital increased through developing new relationships, growth of membership in community organizing groups, strengthened or new networks/coalitions, and an increased sense of community belonging or unity.

Key challenges that were identified in the review included:

1. Administrative barriers: Barriers within public health agencies that made it difficult to organize included limited funding, delays, hiring challenges, unrealistic timelines, and difficulties in defining roles and responsibilities.
2. Approach differences: Differences between public health professionals and community organizers showed up at times as differences in values (e.g., objectivity of research versus simplifying the situation to motivate action) and in the communication styles and language used. Successful efforts found ways to discuss and resolve differences.
3. Challenges associated with community organizing: Some challenges cited are common to many community organizing efforts, such as making sure that the group of people involved are representative of the community as a whole, dealing with shifting circumstances and stresses (which can be exhausting), and the difficulty of attaining enough power to shift the structural factors affecting health.

Can you think of examples of some of these benefits and challenges that we saw in the community organizing case studies above?

The review by Jimenez and Heller concluded that community organizing for health is, indeed, a promising practice for lasting change and one that should be employed and studied further.

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6.9: Applying the Roles of the CHW to a Case Study

A student, Chandra (Shani) Ledah Kelly, from a past semester did a nice job of analyzing the roles of community health workers (CHWs) in the case study about Latino Health Access's work in Santa Ana. She linked the work of CHWs in a community organizing campaign with four roles typically fulfilled by CHWs in all their health work: informing, involving, communicating, and empowering (as discussed in depth in Murphy, 2013). With her permission, I quote from Shani's discussion post here, to illustrate the way that CHWs -- including peer advocates, parent educators, outreach workers, etc. -- might use community organizing approaches in their work.

Latino Health Access campaign to build a park:



Informing: In this case, it was the CHW's that informed the interested parents in processes and potential courses of action to achieve their goal. They also informed other community stakeholders (like the grocer whose land in which they wanted to use for the park) of the goals of these parents and the positive impact it would have on the community. The CEOD article notes that CHW's work as "conduits" communicating between various stakeholders in the community regarding their "respective roles and interests".

Involving: Here, CHW's helped form the community advisory board that worked to solicit funds from local leaders and philanthropic organizations as well as the state. The CEOD article states that "at this point in the process... CHW's can find a role in identifying and soliciting broad-based support and resources".

Collaborating: I think that the collaborative efforts on behalf of the parents, CHW's, local business owners, and community advisory board were imperative to creating a sustainable goal. The inclusion of the community center in the plans for a "safe space" as well as the collaboration of the Latino Health Access organization, provides structures for evaluating and maintaining the park. The CEOD article mentions that "collaboration with the community is also an important precursor to sustainability. There are great opportunities to create synergies in capacity building, cost reduction, and overall effectiveness of solutions implemented".

Empowering: The CHW's with Latino Health Access were paramount in empowering the parents/community members both in this effort and in future endeavors. After CHW's informed and involved community members/stakeholders, then collaborated for sustainability, they met their goal. This has empowered community members by guiding them through this process for change to a positive outcome. According to the CEOD article, "a group of vested CHWs can serve as an enduring repository of knowledge and skills accessible to the community for highlighting new issues and spearheading future efforts".

Reference:

Murphy, F. (2013). Community Engagement, Organization, and Development for Public Health Practice. New York: Springer Publishing Company.

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6.10: Community Intervention Models

This discussion of community intervention models adds more nuance to our discussion of community organizing. The concepts of community as setting, "target," resource, and agent help to shape strategies for community organizing, community building, and health promotion efforts. (More on health promotion in the coming pages!) As you read this page, consider how you might link this new information to concepts we have covered previously, including

- the socio-ecological model
- needs-based vs. strengths-based approaches
- empowerment and community capacity-building
- individual and collective responsibility for health

The social-ecological model identifies several potential areas for intervention and health promotion within a community at each different circle. Yet, just as individuals have varying levels of readiness to change behaviors, so do communities have varying levels of readiness for intervention (McKenzie et al., 2017). Due to group dynamics, physical environments, and political powers which are involved in every community, we cannot necessarily apply the same behavior change theories to a group that we might to an individual. Several researchers have described different approaches to community interventions, some which emphasize looking for deficits (needs-based) and others that emphasize identifying what is already working well (strengths-based). These different models work via social action, advocacy, capacity building, grassroots organizing, and leadership development in order to cause positive change (Seabert et al., 2021).

Community-based health promotion programs often take a holistic approach, in that they are not limited to a single location (like a hospital), they often have multiple, coordinated interventions, and may also focus on environmental and policy changes to support the desired behaviors (Merzel & D'Afflitti, 2003). There are four major models that most community-based interventions fall into according to McLeroy et al. (2003). Most successful community interventions are not only multi-faceted, they also utilize more than one of these models.

- Community as a **setting**. Sometimes the community is simply the geographical location in which the intervention takes place. Health promotion programming might take place at various locations within the community, such as city parks, community centers, churches or other faith-based organizations, hospitals, schools, worksites, or other non-profit organizations. Mass media (like billboards, paper flyers, radio, T.V., or Youtube advertisements, etc.) may be used to convey specific health messaging. When the community is the setting, the goal of the intervention is to elicit personal behavioral change. Therefore, any improvement in population health is the sum of all of the individual behaviors. This model may fail to address environmental, economic, or political influences of behavior and health.
- Community as a **target**. Interventions that target the community seek to make changes to the environment, programs, and/or policies available to community members. Instead of focusing on individual health behaviors as outcomes, these interventions might focus on other environmental or policy measures related to health, such as acreage of park-space per person, or the number of seniors participating in a free lunch program. The assumption is that if the community environment is changed, this will improve healthy behaviors and quality of life.
- Community as a **resource**. This approach seeks to utilize the people and resources within the community to either drive or at least contribute to health-promoting changes. A public health practitioner might bring a health priority to the community and seek input on intervention design as well as leveraging and supporting current resources, or they might ask the community members themselves to identify the highest priority for the community, and build an intervention from there.
- Community as an **agent**. This model assumes that the community already has the solutions and resources to its own health problems. It attempts to "meet people where they are" in supporting the community itself to identify needs, come up with solutions, and implement them. This model might fail to address disparities in social determinants of health that many communities face such as economics, environment, and policy.

Public health interventions are indelibly tied to current cultural perceptions and beliefs about society, and their success depends upon how well they are designed, received, and implemented. To what extent does the responsibility for health lie within each person (individualism) or within society (collectivism)? What role should the government play in protecting and promoting health? As McLeroy et al. (2003) states:

Public health is more than a body of theory and intervention methods. We cannot separate how we do public health from why we do public health. Whether we talk about changing behavior, changing community structures, or building community capacity, these changes cannot be separated from our ideals about what constitutes a good community or a good society.



Figure 6.10.1: Bicycle lane marking on an empty road. (Copyright; hoto by Dave Meier fromfreerangestock.com.)

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6.11: Health Promotion Programs

Health promotion programs are **similar** to community organizing campaigns in that they target a community problem and seek to fix it. They are **different** in that they often are not created BY the community itself, but rather planned by nonprofit organizations, public health departments, clinics, or other professionals working in the community. They often rely on outside funding -- for example, through writing a grant to a private funder or a state office of some kind. They **sometimes** focus on making the kind of structural or environmental changes that a community organizing or community building campaign might tackle -- like removing fast food from schools, or ensuring that all birthing parents in a hospital are provided with a coach to help them initiate nursing (as breastfeeding a baby has tremendously positive health effects, in infancy and throughout the child's life). **Sometimes**, they focus on individual behavior changes -- for example, learning to manage one's asthma better, motivating people to walk more, or reducing trip hazards in the home. They **often** rely on the research from social and behavioral scientists into the motivations for human behavior and what supports behavior change.

Usually, programs focused just on individual behavior -- increasing a group of people's knowledge of a health issue, changing their attitude toward it, or giving them skills to prevent or manage it -- would be called a **health education program.** A **health promotion program** is defined more broadly -- it can include health education, but it might also work on policies, changes to the physical environment, regulations, or organizational practices that improve health.

Definitions from the Joint Committee on Health Education and Promotion Terminology:

Health education: any combination of planned learning experiences using evidence-based practices and/or sound theories that provide the opportunity to acquire knowledge, attitudes, and skills needed to adopt and maintain health behaviors.

Health promotion: any planned combination of educational, political, environmental, regulatory, or organizational mechanisms that support actions and conditions of living conducive to the health of individuals, groups, and communities.

This short (under 2 minutes) video gives the WHO take on health promotion:



This slightly longer video (6 minutes) gives a longer description of health promotion, with great examples, including a discussion of the Ottawa Charter, a key agreement among public health professionals worldwide about health. (Sorry for the annoying background music!)



As you view this second video, pay attention to the five (5) different strategies that are listed as paths to health promotion. Do you notice how broad they are? Often, when people discuss health promotion, they are only thinking of #5, "Developing personal skills" -- teaching people what to do for their own health. That's important, but it's only about 20% of what we can do in health promotion, and it is most effective when we combine it with other strategies.

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6.12: How to create a health promotion program

There are parallels between the phases of planning a **community organizing campaign** and the process of designing a **health promotion program**.

Phases of a Health Promotion Program

The **main phases in designing a health promotion program** are:

1. Assessing the needs of the priority population
2. Setting appropriate goals and objectives
3. Creating an intervention
4. Implementing the intervention
5. Evaluating the results

Compare this to the **10 steps common to community organizing campaigns**. You can see that there are many similarities!

Comparison of Community Organizing and Health Promotion steps

Community Organizing	**Health Promotion**
Recognizing the Issue	*Health promotion does this, sometimes up front and sometimes as part of the needs assessment process*
Gaining entry to the community	
Organizing the people	*Health promotion programs SOMETIMES do this, usually later in the needs assessment or implementation*
Assessing the community	**Assessing the needs of the priority population**
Determining the priorities and setting goals	**Setting appropriate goals and objectives**
Arriving at a solution and selecting intervention strategies	**Creating an intervention**
Implementing	**Implementing the intervention**
Evaluating	**Evaluating the results**

Maintaining and Looping Back (as needed)	

Needs Assessment

The **Needs Assessment process** (sometimes including noting community strengths or assets, as well as needs) is usually more stringent than the community assessment done as part of a community organizing campaign. It might be designed by a public health worker in the local health department, by a graduate student or researcher at a local university, or by a manager at a local nonprofit organization. Needs assessment includes:

- Determining the purpose and scope of the needs assessment -- what do you need to know?
- Gathering data from the community as well as from published sources
- Analyzing the data, formally or informally. Community members *might* be invited to take part in this analysis, but that doesn't always happen.
- Identifying the risk factors (and protective factors) linked to the health problem. This is looking upstream to know what is causing the health issue, or at least seeing what risk factors are associated with it
- Identifying the program focus -- setting priorities based on the data
- Validating the prioritized need -- making sure you got it right

Goals and Objectives

Setting **goals and objectives** is a way to get very specific about what results you expect from the health promotion program. There is a saying, "Start with the end in mind" -- setting your goals before you start the program is one way to place that end, or purpose, front and center.

- **Goals** describe where you want to end up -- for example, to reduce childhood hospitalizations from asthma by 20% over a two year period. It isn't necessarily the "pie in the sky" goal (like, that no one ever gets cancer), but it is a specific view of a future situation that would be much better (like, fewer cases of cancer, or earlier diagnosis).
- **Objectives** are steps toward achieving that goal, and are often worded in a very precise way. SMART objectives are specific, measurable, achievable, realistic, and time-phased.
- There are different kinds of Objectives -- some describe what you will DO (process objectives, describing the process you will carry out). Others describe the IMPACT you expect to have, short-term or long-term. And still others describe an ultimate outcome that gets you closer to your goals. You can see examples of these in Table 5.3
- **HP 2030** provides excellent examples of goals and objectives -- and these goals and objectives are used by health promotion programs all over the country, though different places will have different needs and select different interventions to try to reach those same goals and objectives.

Interventions

Creating an Intervention: An intervention is the set of actions or activities that the program will use to create a change. On pp. 129-132, your textbook provides some examples of the decisions that go into creating an effective intervention. Read through these and think about how they apply to a health promotion program you may be familiar with -- like a healthy relationship program in schools, a smoking cessation program, street fairs, or others.

Implementing the Intervention: Often you start out with what's called a "pilot test" -- meaning, you try it on a small scale before you build it bigger. For example, before you start an afterschool program in a whole city, you might try it out at just one school, first. You use what you learn at that first site, that first school, to improve the program. Then you implement it more broadly, often in phases -- for example, if your goal is to reduce tobacco use at City College, you probably start with an educational campaign and maybe some posters. Then you might limit smoking tobacco to certain areas on campus. Then you might become a smoke-free campus. (This actually happened at CCSF over about a six or eight year period -- we are now a smoke-free campus.)

Evaluation

Evaluating the results: Evaluating the results can help not only one program, but the lessons learned from evaluating it can help

other programs addressing the same health issue. Evaluating a program is similar to a needs assessment process, except it is done while the intervention is already underway and sometimes also after it has ended. Steps include

- Engage stakeholders
- Describe the program (like with descriptive studies we saw in Module 4, it is important to document what actually happened)
- Focus the Evaluation Design
- Gather credible data
- Analyze and justify conclusions
- Ensure use and share the lessons learned

Example

Here is an example provided by a former student's work (Liza Alvarez), based on their experience working in a youth-centered health promotion program. I think it shows how community organizations, local institutions (health department, schools), and affected community members (in this case, youth) can work together to understand a problem and begin to solve it.



Figure 6.12.1: Youth speaking to youth. Free to use under Unsplash license; Photo by Alexis Brown on Unsplash

Needs Assessment for removing access to barriers for youth seeking sexual and reproductive health services and education (possibly leading to implementing a promotores model in the schools)**:**

1. **Determining the purpose and scope of the needs assessment:** The goal of the assessment is to focus the efforts on youth who are most affected by the barriers to accessing sexual and reproductive health services and education
2. **Gathering Data:** Gathering **primary data** will involve partnering with schools and conducting youth surveys that focus on sexual and reproductive health topics. This primary data will be used as a baseline for youth's understanding of sexual health and prevention-related topics. Gathering **secondary data** will involve partnering with local public health departments to gain insight into sexually transmitted infections (STI) rates, and unplanned adolescent pregnancies.
3. **Analyzing data**: Using formal analysis of the information taken from the student surveys and local health departments create an area map to show rates of youth-positive STI and unplanned adolescent pregnancies to identify the areas in a county that are a priority.
4. **Identify risk factors linked to the health problem:** The initial surveys taken for the primary data shown above can ask questions about risk factors linked to the issue. I've listed some example questions below:
    - How confident are you in your ability to properly use a condom?
    - How likely are you to use a barrier method like a condom?
    - How confident are you in your ability to communicate with your partner about safer sex practices?
    - Do you have a trusted adult that you can turn to if you need support with your sexual and reproductive health?
    - Can you name one youth clinic that you can go to to obtain free and confidential sexual and reproductive health services?
    - Myth or Fact: Using birth control can negatively affect your ability to conceive in the future. (**myth**, this is a widely held belief in a lot of communities)
5. **Identifying the Program Focus:**
    - Predisposing factors - youth may not have the knowledge or access to medically accurate information to begin practicing

healthy safer sex practices
    - Enabling factors - youth may not have access to sexual or reproductive health services or comprehensive health education programs
    - Reinforcing factors - may have heard a lot of negative stigmas that surround the use of contraception and tools for safer sex. Where youth gain access to information may be incorrect, such as porn.
6. **Validating the prioritized need:** Focus the program on addressing educational needs to shift the culture on increasing safe sex practices and then enhance the community's access to sexual health clinics

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6.13: Case Study 2- Our Choice/Nuestra Opción- The Imperial County, California, Childhood Obesity Research Demonstration Study (CA-CORD)

Here is another example of a health promotion program, this one based in Imperial County in Southern California.

A CDC funded program focusing on addressing childhood obesity in Southern California took a similar approach to address multiple drivers of health at the same time. In Imperial County, a community along the border of California and Mexico, the population is predominantly of Mexican origin. Communities are somewhat rural and surrounded by agricultural land, and poverty rates are higher than the national average. One significant health disparity exists there as well: childhood obesity rates in these communities are higher than the state and national average, something that this study aimed to change.

Using various theories of behavioral change, models of organizational change, and family systems theory to inform this project, the researchers took a multi-sector approach: involving pediatricians, community health workers, school teachers, restaurant owners, and families. The program included a healthcare approach for overweight and obese children and their families at federally funded healthcare clinics. Family workshops with trained Community Health Workers (CHWs), included education on healthy eating and physical activity. The CHWs also followed up with motivational interviewing phone calls to parents, and newsletters were sent to the families to encourage them in continuing healthy behaviors. Since local elementary schools didn't have specialized Physical Education teachers, current staff attended training sessions and received new PE equipment to use, both sponsored by the project. A few local restaurants worked with the program to develop healthy kid's menus. Additionally, the project funded education and supplies for community gardens to help families learn more about backyard gardening for fresh produce (Ayala et al., 2015).

While projects like these are time consuming and require the buy-in and contributions of many people, they can be instrumental in causing lasting changes in communities by addressing multiple social determinants of health at once. Ultimately, no single policy or program is likely to cause significant improvements to the social determinants of health alone. Using the social-ecological model (and other theories) can help public health practitioners design effective, meaningful programs that initiate positive changes for individuals, families, communities, and eventually - whole populations.

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- 13.15: Case Study 2- Our Choice/Nuestra Opción- The Imperial County, California, Childhood Obesity Research Demonstration Study (CA-CORD) by Erin Calderone is licensed CC BY 4.0.

6.14: Lessons from Geese

In conclusion, I want to share a frequently-quoted reading that I have always liked, called "**Lessons from Geese**."

FACT 1: As each goose flaps its wings, it creates an "uplift" for the birds that follow. By flying in a "V" formation, the whole flock adds 71% greater flying range than if each bird flew alone.

LESSON: People who share a common direction and sense of community can get where they are going quicker and easier because they are traveling on the thrust of one another.

FACT 2: When a goose falls out of formation, it suddenly feels the drag and resistance of flying alone. It quickly moves back into formation to take advantage of the lifting power of the bird immediately in front of it.

LESSON: If we have as much sense as a goose we stay in formation with those headed where we want to go. We are willing to accept their help and give our help to others.

FACT 3: When the lead goose tires, it rotates back into the formation and another goose flies to the point position.

LESSON: It pays to take turns doing the hard tasks and sharing leadership. As with geese, people are interdependent on each other's skills, capabilities and unique arrangement of gifts, talents or resources.

FACT 4: The geese flying in formation honk to encourage those up front to keep up their speed.

LESSON: We need to make sure our honking is encouraging. In groups where there is encouragement, the production is much greater. The power of encouragement (to stand by one's heart or core values and encourage the heart and core of others) is the quality of honking we seek.

FACT 5: When a goose gets sick, wounded or shot down, two geese drop out of formation and follow it down to help and protect it. They stay with it until it dies or is able to fly again. Then, they launch out with another formation or catch up with the flock.

LESSON: If we have as much sense as geese, we will stand by each other in difficult times as well as when we are strong.

References:

I have heard this quote attributed to Angeles Arrien, to Milton Olson, and to Robert McNeish, as well as "Anonymous." At this point the story is practically folklore.

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6.15: Additional Resources

Community Tool Box -- explain why it's useful (ADD) for CO, CB, and PP

Prevention Institute - explain and give an example of their work in public health grounded in community organizing and community building

Collaboration Multiplier Tool (from Prevention Institute) -- increase impact through collaborative efforts of different organizations or agencies with overlapping goals and distinct strengths

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7: ENVIRONMENTAL HEALTH

Overview

Human health depends a great deal on the health of our environment. This week we will examine hazards to health in the environment, in the air we breathe, the water we use, the food we eat, the place we live, and the natural world around us. These hazards range from the tiniest microbes to planetary climate change. We will explore how public health acts to protect environmental health.

7.1: Introduction

7.2: Learning Outcomes

7.3: What is environmental health

7.4: Environmental Health and the Emergence of the Modern Environmental Movement

7.5: Measuring Risk

7.6: Laws to Protect the Environment and Human Health

7.7: Clean Air

7.8: Clean Water

7.8.1: Flint Water Crisis

7.8.2: Case Study- The Jackson Water Crisis

7.9: Waste Management

7.9.1: Types of Trash/Municipal Waste

7.9.2: Recycling and Composting

7.9.3: Sanitary Landfills and Combustion

7.9.4: Hazardous Waste, RCRA and CERCLA

7.10: Food and Drug Safety

7.11: Occupational Health Concerns

7.11.1: Occupational Health Policy

7.11.2: Workplace Injuries and Illnesses

7.12: Climate Change and Environmental Health

7.13: Climate Change

7.14: The Health Effects of Climate Change

7.15: Preventing Climate Change and Adapting to Climate Change

7.16: Co-Benefits of Taking Steps to Address Climate Change

7.17: Climate Change Policy

7.17.1: The Paris Agreement

7.17.2: Climate Change Policy in California

7.17.3: Emergency preparedness (whether emergency is climate related or not)

7.18: Additional Resources

7.19: References - if not already on each page

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7.1: Introduction

Environmental health includes both the human impact on the earth, as well as the health effects of different environmental exposures (chemicals, gasses, radiation, etc.) on humans. According to the World Health Organization (WHO):

> Healthier environments could prevent almost one quarter of the global burden of disease....Clean air, stable climate, adequate water, sanitation and hygiene, safe use of chemicals, protection from radiation, healthy and safe workplaces, sound agricultural practices, health-supportive cities and built environments, and a preserved nature are all prerequisites for good health (WHO, 2020).

Why is environmental health such a large and active area of public health?

Environmental factors contribute to leading causes of morbidity and mortality around the world, causing nearly 1 in 4 human deaths globally in 2016 (WHO, n.d.). Recognizing that human health is interconnected to the health of animals as well as the entire ecosystem in which we live, the One Health framework has been developed to promote an interdisciplinary approach to environmental health. Taking this holistic approach can help to reduce zoonotic disease transmission, improve access to food and clean water, and mitigate and adapt to the effects of climate change (WHO, 2022). Environmental health draws on the sciences of biology, ecology, chemistry, engineering, and more to address hazards that threaten human (and animal) health.

In this chapter, we'll start with an overview of environmental health and how public health approaches environmental hazards. Then we will look at several specific environmental health concerns:

- Clean air
- Clean water
- Waste management
- Food and drug safety
- Climate change
- Occupational health

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7.2: Learning Outcomes

At the completion of chapter, students will be able to

1. Discuss pollution as a major risk to human health at this time, in particular in the developing world.
2. Discuss risk assessment and the concept that "the dose makes the poison".
3. List sources and types of pollutants, including the six criteria pollutants, and explain the difference between primary and secondary pollutants.
4. Describe the role of the Environmental Protection Agency (EPA) in protecting the environment.
5. Outline the provisions of the Clean Air Act, and explain the purpose of air quality standards.
6. List the major types of indoor air pollutants and describe ways to reduce exposure to them.
7. Explain the difference between point source and nonpoint source pollution (and what difference it makes when you are trying to reduce pollution)
8. Give examples of biological and nonbiological pollutants that threaten our drinking water.
9. Define the term "waterborne disease outbreak" and give examples of agents that can cause such an outbreak.
10. Describe the measures communities take to ensure the quality of drinking water and to manage wastewater.
11. Explain the general purpose of the Clean Water Act and the Safe Drinking Water Act.
12. Define pest, pesticide, target organism and nontarget organism.
13. Explain some of the health and safety concerns with pesticide use.
14. Describe the composition of municipal solid waste (MSW) and outline acceptable MSW management strategies.
15. Discuss the importance of "reduce, reuse, recycle" as an approach to reducing waste.
16. Define hazardous waste and give some examples.
17. Identify approaches used by the FDA, the USDA, and local health departments use to ensure food safety.
18. Describe in general terms how the FDA ensures drug safety.
19. Discuss occupational health risks and protections in relationship to environmental health.
20. Discuss climate change as a risk to human health, including how it may affect rates of infectious disease, access to food and clean water, natural disasters, forest fires, air quality and heat exhaustion.
21. Explain mitigation and adaptation as strategies to cope with climate change.
22. Discuss how measures to address climate change may also contribute to improvements in overall health (for example, prevention of chronic disease) – the "co-benefits" of action on climate change.

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7.3: What is environmental health

Here are a pair of definitions to get us started.

Environmental health – the study and management of environmental conditions that affect the health and well-being of humans

Environmental hazards – factors or conditions in the environment that increase the risk of human injury, disease, or death

Please watch this short video from the American Public Health Association for a quick overview of the environment's impact on health:

YouTube Video

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this YouTube Video online

Environmental health is a very broad and essential component of protecting the public's health. Environmental health can work to prevent injuries (such as poisoning and burns), infectious diseases (such as those spread by parasites in water or food) and chronic conditions (such as cancer and asthma).

Environmental health also focuses on occupational health and working conditions. By examining the conditions at work sites and the physical risks to health, environmental health measures can keep us safer on the job.

Environmental health works to improve big systems that we interact with every day - such as how clean water will be delivered, how food will be processed, and how waste of all kinds will be disposed of.

Fundamentally, environmental health works to make sure that our communities, our workplaces, our water supply, and our nation as a whole are as free of hazards as possible.

How big of an influence is the environment on health?

The Lancet, a major medical journal from the UK, has released a number of studies about the effect of pollution on health. One landmark one came out in 2016. While in many past analyses, environmental causes of disease and injury have been generally seen as significant yet not huge -- maybe causing 5-15% of deaths -- the report from *The Lancet* offered a new view. They say that pollution kills up to 9 million people a year -- making it one of the leading causes of death. **Check out this brief video from *The Lancet* (required) -- captions available:**

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7.4: Environmental Health and the Emergence of the Modern Environmental Movement

If you think back to the story about John Snow breaking the handle off the Broad Street pump, to stop the spread of cholera in London in the 1850's, then you can see that public health has always been concerned about environmental health. Access to clean water and the question of how to dispose of sewage were among the first priorities of public health. Even today, in much of the world, these are the fundamental health problems that need to be addressed, to stop the spread of disease.

The modern environmental movement in the U.S. really kicked off in 1962 with the publication of *Silent Spring*, by Rachel Carson, a book that showed how pesticides were affecting the health of birds and were moving through our food supply and into our own bodies. Environmental health professionals joined with others - chemists, biologists, activists, farmers - to demand safety standards for pesticides and other chemicals in our environment.

Today, however, while there is regulation of SOME chemicals in our environment (usually through EPA, USDA or the FDA), thousands more chemicals are put into consumer products, agricultural products and industrial uses than could ever be tested for risks to human health. Often, a dangerous chemical does not start to be regulated until after it has caused some notable harm.

OPTIONAL: watch this five-minute clip about Rachel Carson's work and the growing awareness of pesticides in the 1960's.

NOTE to self: in Home > Older Versions > H54-W13-EnviroHealth-NoCC there are some "test your understanding" questions and an image from NYT probably not fair use.

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7.5: Measuring Risk

If I had to write on a post-it how environmental health workers assess risk, I'd jot down two phrases: the dose makes the poison and risk-benefit analysis.

The golden rule of toxicology: The dose makes the poison

Let's talk about "**the dose makes the poison**" first. This relates to hazard mapping. Just as something in the workplace that is hazardous in large quantities might not be hazardous in small quantities (for example, a match is less hazardous than a pizza oven), the dose of any kind of chemical or toxin makes all the difference between whether it is dangerous (poisonous, even) - or not.

One of the key tasks in toxicology (the study of toxins) is to determine how much of any given chemical can harm us. We are not able to live in a world without chemicals - even if we didn't produce gobs of them (for example, the chemicals in personal care products), we would still be exposed to naturally-occurring chemicals in the environment. The Environmental Protection Agency (EPA) tests about 1,500 new chemicals every year - yet upwards of 80,000 chemicals are used in commercial production in the US alone.

Many, many chemicals we come in contact with have not been tested, or not tested enough.

Even so, toxicologists do important work to determine *what dose is safe* - or in the case of medicines, even therapeutic. Anything can be a poison in too high a dose - even water. You may have heard of cases of people chugging gallons of water and having to be hospitalized as a result. The opposite is not true, however - it is not true that everything is safe in a small-enough dose (as there are some chemicals that are not safe in any dose).

The dose makes the poison. How much of something enters the body makes all the difference in how the body will respond.

Whose body? When measuring the safety of a chemical, researchers have to take into account that there are populations that are especially vulnerable - babies, children, elders, people with suppressed immune systems, etc. A calculation is made, for example, that if 10 mg is the safe dose for healthy adult, then a child should be exposed to no more than 10% of that.

Chemicals that were already in use before the 1970's wave of environmental regulations often have not been tested or assessed for safety. Industry was allowed to continue using what it had been using in the past, unless some new evidence emerged of its danger.

Tylenol (acetaminophen) is an important example to consider. Tylenol is very effective and very safe at the prescribed dose. It often causes less stomach pain than aspirin or ibuprofen, and it can be used in babies and children (aspirin, on the other hand, is not safe for children). It is frequently recommended by doctors and physicians, for these reasons. Yet Tylenol is responsible for a surprisingly high number of deaths every year in the US - something like 400 a year. This is because it is poisonous at higher-than-recommended doses. For someone who has a weakened liver already (due to illness or alcohol consumption), or for a child, taking as little as one or two extra pills of Tylenol beyond the recommended dose, can be poisonous. In general, we prefer to see medications where there is a bigger distance between an effective dose (say, 400 mg) and a dangerous dose (600 or 800 mg). But because Tylenol has been in use for a long time - and it does a good job, at the right dose - it continues to be widely prescribed and sold over the counter. (For more about the risks of Tylenol, you might want to listen to this optional episode of This American Life.)

Risk-Benefit Analysis

It is impossible to remove all hazards, all risks. The key question is, what risks are acceptable to us? And why?

Risk-benefit analysis is something we all do, informally. For example, if I go in late to work, there is a risk I will get in trouble. However there is a benefit to me too - maybe 15 extra minutes of sleep, or a chance to take the later train that isn't crowded. If the risk associated with arriving late is very great - say, I might get fired - then it is likely to outweigh the benefit. If the risk is small - I might get a nasty look from the boss - then the benefit starts to seem more attractive. If the benefit is very great - say, I go in late because I'm interviewing for a better job - then that could outweigh even a steep risk (like getting fired).

Environmental health professionals define and quantify the risks and benefits associated with different human activities and with different technological solutions. In addition to understanding science and public health and engineering, environmental health professionals may benefit from some studying math and economics, too.

Risk-benefit analysis also is reflected in discussions of environmental justice. We have to ask, whose risk? whose benefit? Communities are often presented with a choice about an environmental hazard that is phrased as jobs versus environment. That is, the benefit of industry is that it offers jobs, and the risk is that it pollutes. In many cases, this can be a false choice, when there is a third option available (even if it is more expensive), such as safe clean jobs in an industry that has minimized pollution to an acceptable level.

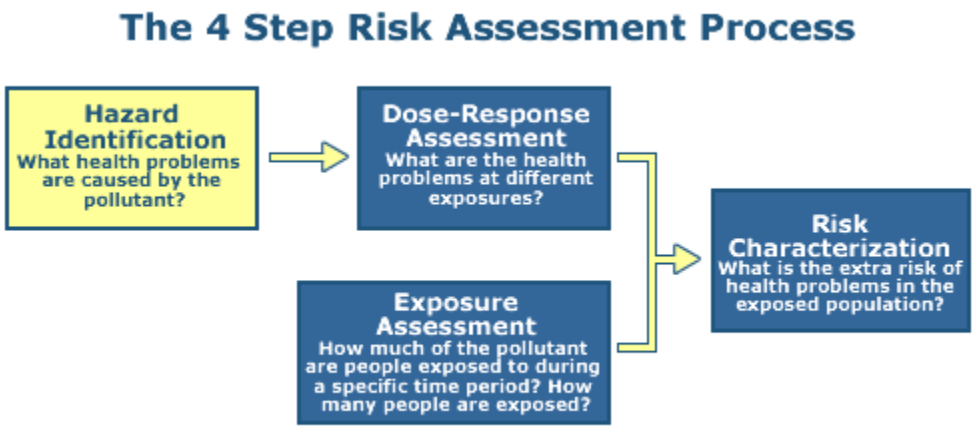


Figure 7.5.1: The 4 Step Risk Assessment Process. (Public Domain; EPA via https://www.epa.gov/risk/conducting-...isk-assessment)

Risk assessment typically involves four steps:

1. Hazard Identification: What health problems are caused by the pollutant in question?
2. Dose-Response Assessment: What are the health problems at different exposures? (at some doses, even a hazardous substance may be safe)
3. Exposure Assessment: How much of the pollutant are people exposed to during a specific time period? How many people are exposed?
4. Risk Characterization: What is the extra risk of health problems in the exposed population? (For example, while cancer may already be a risk, the exposure to asbestos increases the risk of cancer, so we want to quantify that "extra risk" associated with the asbestos exposure.)

Knowing how large the risk is, we can weigh it against the benefits that generating the pollution might bring. That decision is often a political decision, as there is no one scientific measure to determine if a certain benefit is worth the risk.

Test your understanding:

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7.6: Laws to Protect the Environment and Human Health

Environmental regulation was developed in response to the growing awareness of environmental risks, many of them man-made, many of them the result of industrialized agriculture and manufacturing. In the 1970's, laws were passed that still shape the health of our environment today.

Some of the most important environmental laws included:

- **The Clean Air Act amendments of 1970**- which required monitoring and regulation of six common air pollutants known to be health hazards (substances that negatively affect health). These six pollutants (called the "criteria air pollutants") include
  - particulate matter such as smoke, soot and ash (which is especially dangerous to human health when the particulates are very small and can stick in the lungs)
  - sulfur dioxide and nitrogen oxides (two common causes of "acid rain" that are mostly produced by industry)
  - carbon monoxide (highly poisonous, and largely created by motor exhaust - improvements in the engineering of cars and trucks has greatly reduced this toxin in the atmosphere)
  - ozone (a form of oxygen (O_3) that is very protective for us when it is in the upper atmosphere but quite toxic when it is appears at ground level
  - lead (highly toxic to the nervous system, blood and kidneys, especially for children who get exposed to lead when their brains are still developing - common in paint, some plastics and until the mid-1970's in gasoline)
- **The Clean Water Act of 1972** (amended in 1977 and more times since then) - the set goals for ensuring that lakes and rivers should be "fishable" and "swimmable" and that pollutants should not be discharged or spilled into lakes, rivers or other parts of the water supply. It also set in place standards for treatment of waste water from sewage as well as industrial waste, and instituted measures to minimize pollution from rain and storm runoff (which can wash agricultural chemicals from fields and gasoline from streets into rivers).

- **The Safe Drinking Water Act of 1974** (rewritten in 1996) - which required the Environmental Protection Agency (EPA) to set standards for local water systems, which are enforced at the state level. Drinking water is treated usually through a process that includes sedimentation, coagulation, filtration and disinfection - to remove contaminants that could affect health. While many people now prefer bottled water (due to excellent marketing from the corporations that benefit from the sale of bottled water), in the U.S. tap water is of very high quality - in fact, it is often safer than bottled water (which is less tightly regulated).

> Recent Supreme Court decisions have limited the reach of the Clean Water Act and the Clean Air Act, for example, limited the scope of environmental reviews, removing some wetlands from the Clean Water Act protections, and limiting the EPA's ability to regulate carbon pollution and some other pollutants (ADD CITATION). These changes along with changes in the EPA and a political environment that questions the role of regulations on business may lead to changes in how these laws are implemented, in reality.

NOTE: there are some "test your understanding" questions from SoftChalk I could put in here

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7.7: Clean Air

While air pollution is certainly a contributor to climate change via GHGs, it also harms human health in other ways. Air pollution is generated both by natural (biogenic) and human (anthropogenic) sources. Wildfires and volcanoes can spew particulate matter into the air, while vehicle emissions and industrial pollutants produce smog and other gasses. Some air pollutants also undergo chemical reactions when exposed to sunlight which create harmful ground level ozone. Wind currents and water vapor can carry pollutants miles away from their original source. The WHO asserts that both ambient (outdoor) and indoor air pollution contribute to over 7 million deaths around the world each year (WHO, 2019).

The Clean Air Act of 1970 regulates air pollution by empowering the Environmental Protection Agency (EPA) to set and enforce air quality standards. There are six pollutants for which the EPA sets National Ambient Air Quality Standards (NAAQS) for, which are called **criteria pollutants.** These include carbon monoxide, sulfur dioxide, nitrogen oxide, particulate matter, ozone, and lead. In 1990 the Clean Air Act was amended to include another category of **hazardous air pollutants**, such as volatile organic compounds (VOCs), pesticides, herbicides, and radionuclides (Frumkin, 2016). The Agency for Toxic Substances and Disease Registry (ATSDR), an agency of the U.S. Department of Health and Human Services, responds to potential toxic emergencies, assists local public health departments, conducts research, and maintains a registry with toxicological profiles of the health effects of natural and man-made hazardous substances that affect our soil, water, and air (ATSDR, 2024).

Primary air pollution is released straight from its source. For example, carbon monoxide is released from motor vehicle exhaust and the combustion of fossil fuels in power plants. It is also released in smoke from forest fires, and is present in environmental (or “second-hand”) tobacco smoke. When other compounds like nitrogen oxides and sulfur dioxide are exposed to sunlight, they can undergo chemical reactions that create ozone and particulate matter. These subsequent pollutants are called **secondary** air pollution. Thus, air quality is often worse on warm, sunny, summer days than on colder, winter days (Frumkin, 2016, Seabert et al., 2021).



Figure 11.4.2.1: Smoke cloud from the Mosquito Fire in California, September 2022. Cal Fire. (Public domain, via Wikimedia Commons)

Ozone is both beneficial and hazardous to human health depending on where it exists. In the stratosphere (upper layer of Earth’s atmosphere), ozone blocks harmful UV rays from the sun and protects humans, plants, and animals below - preventing things like skin cancer and cataracts. Compounds called chlorofluorocarbons (CFCs) were used extensively in the mid-20th century to make aerosol propellants, for refrigerators, and in building materials, but these and other pollutants were found to be depleting the ozone layer. Fortunately, in 1987, the Montreal Protocol was signed and countries began phasing out production of ozone depleting substances. Scientists predict that it will be completely repaired by the middle of the 21st century (EPA, 2023). Ground level ozone (in the troposphere) on the other hand, is quite harmful to humans, plants and animals. It can damage the heart and lungs and lead to a variety of chronic diseases (USGCRP, 2023a). Ozone can also be worse in the summer months as a layer of warm air called an inversion layer will trap pollution closer to ground level instead of letting it disperse upward into the stratosphere (Seabert et al., 2021).

Particulate matter is made up of very fine particles of dust, soot, and other solids or liquids of varying sizes. When breathing through the nose, larger particles are typically caught in the nose and upper respiratory system, trapped in mucus and expelled in coughs and sneezes. However, fine particulate matter, or PM2.5 (particulate matter smaller than 2.5 micrometers) can get inhaled much deeper into the lungs and cause damage to lung tissue, as well as increasing the risks of cardiovascular and neurological issues (USGCRP, 2023a). Particulate matter comes from dust, smoke, industrial pollution, vehicle emissions, pollen, and even sea-spray (Frumkin, 2016). We often see particulate matter in the air as smog or brownish haze, hovering over a city-scape on a sunny day.

Air pollution disparately affects minoritized communities including people of color and those of lower socioeconomic status, both in urban and rural areas. This can often be connected to policies and practices such as redlining, as well as industrial zoning. Exhaust from diesel trucks and industrial facilities can be much higher in urban areas, whereas rural areas may be more exposed to pollution from agricultural practices - such as dust and pesticides from crops, or emissions from concentrated animal feeding operations (aka “factory farms). Power plants also release air pollution as well as GHGs. Air quality is made worse by climate change, particularly during heat waves, which may create more secondary air pollution (USGCRP, 2023a).

While the EPA monitors and regulates ambient air pollution, it does not have the same oversight of indoor air pollution. Indoor air pollution can come from building materials, insulation, environmental tobacco smoke, and burning wood, coal, kerosene and even natural gas for cooking or warmth. Mold, mildew, pet dander and dust can also cause respiratory problems. Household cleaning products can release VOCs, which can be particularly harmful to the respiratory system if certain compounds are mixed and then inhaled. Improperly vented combustion for cooking or heating releases carbon monoxide, nitrogen oxides, and particulate matter into the household air. Radon is a radioactive gas that is released from uranium-rich rocks, and can seep into cracks in a home’s foundation and cause lung cancer. Switching to cleaner fuel sources for cooking (such as electricity), removing sources of pollution (such as environmental tobacco smoke), using appropriate ventilation when using cleaners or solvents, and using central ventilation and air conditioning (HVAC) filters or portable air filters are all ways to reduce indoor air pollutants. Additionally, any home improvement projects done on old houses should first be tested for asbestos and lead - as these were commonly used in building materials in the 20th century (EPA, 2014). According to the WHO, 2.3 billion people around the world still use solid fuel for cooking (such as wood, charcoal, and dung), exposing mostly women and children to high levels of air pollution and increasing the risk of respiratory and cardiovascular diseases, cancers, and some infectious diseases as well. In low and middle-income countries, efforts can be made to move toward cleaner fuel sources, such as natural gas and electricity, which would improve air quality, reduce GHGs, and improve health equity (WHO, 2023).



Figure 11.4.2.2: Woman feeding a cast iron wood stove. (Public Domain, CDC/ Dawn Arlotta, 2009.)

This home’s interior, though beautiful, houses a potential hazard on many levels, therefore, special care need be taken in order to safely operate this wood-burning stove, for not only does it generate a terrific amount of heat, it does so using flame, rather than electricity, which is much more difficult to control. This woman was about to place what appears to be a piece of treated lumber (which can also release harmful pollutants) into the stove as fuel.

NOTE: For more about ozone and how the world came together to start fixing the "ozone hole", please see the page on Additional Resources.

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7.8: CLEAN WATER

Humans cannot survive without water. Nearly all cities and towns have been built around sources of freshwater for drinking and agricultural uses. While our “blue planet” may be covered in water, the majority of it is too salty to be used for these purposes. In fact, only about 1% of the water on earth is both freshwater and accessible to humans via the water cycle (aka hydrological cycle). Water from melting snowpack and rain flows through rivers and streams to lakes and oceans and sinks into underground aquifers. From lakes and oceans it is evaporated into the atmosphere as water vapor. Eventually once this water vapor condenses into clouds and gets heavy enough, it is returned to the ground via precipitation (rain, snow, etc.) Freshwater is accessible to humans from two sources. **Surface water** includes any water source open to the air: lakes, rivers, streams, ponds, etc. The other source is **groundwater** which comes from underground aquifers, wells, and springs. Groundwater has long been considered more ideal for human use since it has been filtered through soil and rock, and will thus require less treatment. Surface water is often full of dirt, microbes, and pollutants which requires an extensive filtration and disinfection process in order to be drinkable (Frumkin, 2016).

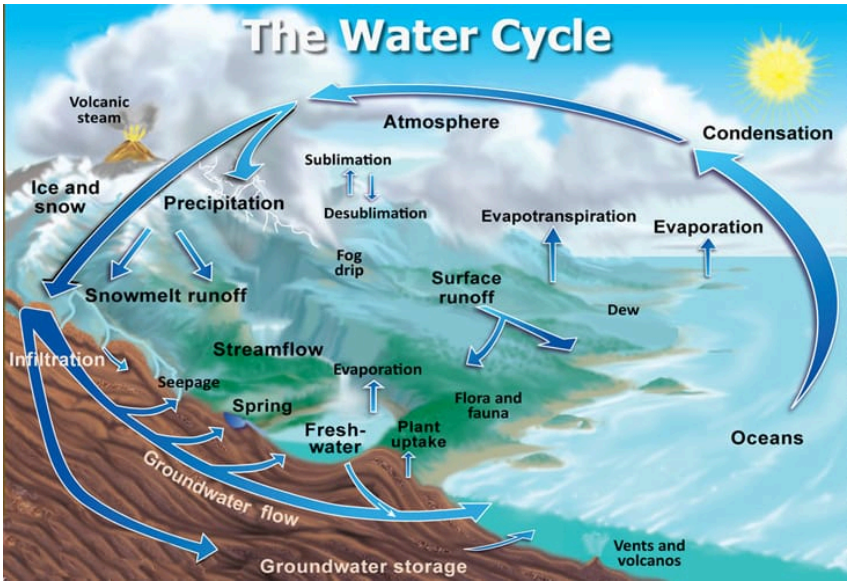


Figure 7.8.1: Water Cycle Summary.. (Copyright; John Evans and Howard Periman, USGS, Public domain, via Wikimedia Commons)

Drinking water can get contaminated by pollutants, chemicals, or biological contaminants from a variety of sources. **Point source** contamination occurs when there is a single source or multiple identifiable sources - such as a specific pipe dumping industrial chemicals into a stream, or several septic tanks leaching fecal matter into groundwater. **Nonpoint source** contamination occurs from an array of different sources - such as pesticides from agricultural runoff, or when rainwater picks up gasoline and oil on roadways. There are many different types of contaminants; they may be organic or inorganic chemicals, biological contaminants (such as bacteria, viruses, or protozoa), and even pharmaceuticals - which can lead to antibiotic resistance (see chapter on infectious diseases). Drinking water must therefore be properly filtered, disinfected, transported (via well-maintained pipes), and regularly tested in order to prevent toxic exposures or waterborne illnesses in humans and animals (Frumkin, 2016).

Particularly in developing countries around the world, many infectious diseases and toxic exposures can be prevented with improved access to water, sanitation, and hygiene practices. Combined, these are called **WASH.** The WHO estimates that despite major progress in the last 30 years, diseases caused by unsafe WASH still account for over 1.4 million deaths (in 2019), the majority of those related to diarrheal diseases - which affect hundreds of thousands of young children each year (WHO, 2023a). Sanitation and the proper treatment and disposal of wastewater also significantly impact exposure to pathogens. While wastewater can be an important source of water recycling (such as greywater from sinks and showers), many countries may lack sewage facilities, and open defecation is still practiced in many low-income countries, particularly in rural areas. Overall, inadequate sanitation accounted for the highest percentage of diarrheal disease deaths (38%). Yet sanitation is closely related to safe drinking water, which accounted for 35% of diarrheal disease deaths (WHO, 2023a). Open defecation or inadequate disposal of fecal matter can easily contaminate surface water, which may be collected downstream for drinking and agricultural uses. Proper handwashing behaviors (i.e. using soap, washing after potential fecal contact or before preparing food), are also extremely effective at reducing pathogen transmission. Both the resources - soap and water - and the education (knowing why it is important) are necessary to change behaviors. Yet even in high income countries these behaviors are not universally practiced

(WHO, 2023a).

Although improving WASH is of particular importance in low and middle income countries, there are many potential sources of contamination in high income countries as well. In the U.S. there are two laws that primarily govern safe water sources: the Clean Water Act (CWA, 1972), and the Safe Drinking Water Act (SDWA, 1974, amended in 1986 and 1996). The CWA empowers the EPA to regulate surface water for fishing and recreation, as well as wastewater management - requiring industries and municipalities to pre-treat any wastewater before it enters into waterways. This law also prevents oil spills that could affect inland water and tasks the EPA with responding to those that do happen. The SDWA governs the treatment and delivery of drinking water to municipalities; protecting surface and groundwater sources of drinking water, as well as enforcing health standards for all public drinking water systems (Frumkin, 2016, and EPA, 2013). Even with these protections in place, water contamination still occurs, and tends to most often impact historically marginalized communities.

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7.8.1: Flint Water Crisis

7.8.2: Case Study- The Jackson Water Crisis

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7.8.1: Flint Water Crisis



Figure 7.8.1.1: Water tower at the water treatment plant in Flint, Michigan. (Unknown, United States Environmental Protection Agency, Public domain, via Wikimedia Commons. April 11th, 2016.)

The story of the Flint Michigan water crisis is one of a human-made public health catastrophe that could have been avoided at several junctions. Flint, Michigan is a majority Black city. In 2014, 40% of the residents there lived in poverty (Murembya, & Guthrie, 2016). Flint was having a financial crisis, and an emergency manager was appointed by Michigan's governor. One of the ways proposed to save money was to switch Flint's water source: from the Detroit Water and Sewerage Department (DWSD) to the Karegnondi Water Authority (KWA), which was building pipeline from Lake Huron - where Flint, Detroit and other towns already sourced their drinking water. Upon hearing of this plan, the DWSD terminated its contract with Flint effective 2014, but the KWA pipeline wouldn't be ready until 2016 (Dixon, n.d., Kennedy, 2016). Until the pipeline was completed however, they needed an alternative water source for the city of Flint. For this, they turned to the Flint River, which had been the city's water source up until the 1960's (Kennedy, 2016).

Instead of treating the water or testing to ensure that the water would not corrode the city's aging pipe system, city officials took a "wait and see" approach. Barely a month after the switch, residents in Flint began to complain about their tap water's color and odor. Some people developed rashes or hair loss by showering or bathing in it (Runwal, 2024). By August, officials had detected E. coli bacteria, which prompted them to increase the chlorine levels and issue boil advisories to residents. Meanwhile, an outbreak of Legionnaire's disease, caused by the bacteria *Legionella pneumophila, was* correlated to the water source switch and improper chlorination (Zahran et al., 2018), causing the deaths of at least 12 people (Runwal, 2024). By January of 2015, other compounds (by products of disinfection which are carcinogenic) had also been found in the water - this violated the SDWA and forced the city to take some action (Kennedy, 2016).

In February, high levels of lead were found in the water of a resident's home. While the EPA issued an internal memo expressing concerns about lead contamination, the city officials in the Michigan's Department of Environmental Quality (MDEQ) downplayed the reports and insisted that Flint's water was safe. Meanwhile, researchers from Virginia Tech University were finding dangerously high lead levels in the water supply and blood levels in children (Kennedy, 2016). Lead is a neurotoxin which is especially harmful for children: it can cause learning disabilities, behavioral problems, as well as affecting growth and potentially causing anemia or in some kids - seizures. If ingested by pregnant women it can harm the growth of the fetus and lead to premature birth. And in adults, exposure to lead is associated with cardiovascular, kidney, and reproductive problems (EPA, 2016). In September of 2015, the city finally issued a lead warning to the city, and in October a state of emergency was declared and Flint switched back to the Detroit water supply (Kennedy, 2016). But the hazards were not over.

The pipes that brought water to the city were old, and made of lead and galvanized iron. Since the Flint river already had higher levels of chloride, this began to corrode the pipes, and the chlorine added to reduce the *E. coli* bacteria corroded the pipes even more. By the time the water was switched back to the Lake Huron source, it was too late - in April of 2016 the water was declared still unsafe to drink by Virginia Tech researchers (Kennedy, 2016). Many Flint residents have continued to drink bottled water as the pipes are slowly replaced throughout the city - even though the free bottled water program ended in 2018 (Runwal, 2024). Many of the city and public health officials were criminally indicted for not following proper procedures and covering up reports of

contamination, and even Governor Rick Snyder had charges related to his apparent inaction for 17 months during the water crisis. Yet many of these cases were thrown out on technicalities by the Michigan State Supreme Court, leaving Flint's residents doubting anyone will be held accountable (White, 2022). The state of Michigan was ordered to pay out $600 million in a settlement to Flint's residents - a portion of which will also cover legal fees (White, 2021).

In late 2019, PBS's investigatory news show Frontline broadcast this documentary on the Flint water crisis, why it happened, and what it means for the rest of the country. If you would like to understand more about the Flint Water Crisis, you can view it here (optional).

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7.8.2: Case Study- The Jackson Water Crisis



Figure 7.8.2.1: A Mississippi National Guard soldier takes water to a person's car at the Mississippi State Fairgrounds in Jackson, Mississippi, Sept. 1, 2022. Nearly 600 Mississippi National Guardsmen were set up across seven sites through Jackson for people to collect bottled water and non-potable water from water buffalo trucks during the water crisis. (Copyright; Staff Sgt. Connie Jones, U.S. Army National Guard, CC BY 2.0, via Wikimedia Commons.)

The residents of Jackson, Mississippi are no strangers to boil-water advisories. The city has dealt with infrastructure problems for years; massive leaks, *E. coli* and lead concerns, and a lack of funding and staffing to maintain its aging water and sanitation facilities (Pettus, 2022). A cold snap in 2021, and heavy winter storms in 2022 caused pipes to burst and shut off water supplies to thousands (Adams, 2023). When heavy rains caused the nearby river to overflow in the summer of 2022, one of the city's two water treatment facilities was compromised (Breslow, 2022). Since low water pressure allows bacteria and other contaminants to seep in through cracks in the aging pipes, residents were under yet another boil-water advisory, and bottled water was distributed (Pettus, 2022).

Jackson's chronic water crisis demonstrates the complex interplay of social determinants of health, environmental health, public health policies, and politics. To begin with, 80% of the 150,000 residents in Jackson, Mississippi are Black, and a quarter of them (25%) are at or below the poverty threshold (Pettus, 2022). Mississippi has a long history of racism and white supremacy, with Jackson at the center of the Freedom Riders protest, when civil rights activists were arrested for riding segregated public transportation from DC (Contributors to Wikimedia projects, 2024). Jim Crow laws, housing discrimination and underinvestment in communities of color have disproportionately exposed Black populations to environmental hazards (USGCRP, 2023c). After the integration of schools in the 1960s, white families moved out of Jackson *en masse* over the next several decades - so called "white flight" to the surrounding suburbs (Wiggins & Morrow, 2022). For these and other reasons, tax income to the city has declined, and Jackson has long had problems with finding money to fix its infrastructure (Pettus, 2022), some of which is over 100 years old (SPLC, 2023). Jackson's history of discrimination and underinvestment are compounded by emerging environmental factors. Climate change is contributing to more rainfall and severe storms - including hurricanes and more severe flooding in the southeast U.S. region (USGCRP, 2023c). While an EPA investigation into the recent water crisis concluded that state agencies did not racially discriminate against Jackson's residents in distributing federal funds for infrastructure updates (Muhammad & Judin, 2024), it is clear that a combination of systemic and historic racism, poverty, policies, and climate change are contributing to the struggles Jackson is facing in providing clean water to its residents.

You may also want to view this brief news story from PBS News Hour (September 12, 2022) about the Jackson water crisis.

YouTube Video

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7.9: WASTE MANAGEMENT

Modern humans create much more waste than our animal counterparts and even our human predecessors. According to the EPA, the average American produces nearly 5lbs of trash per day, the majority of which is paper and food waste. Compare that with 1960 - when the average was only 2.68lbs of trash per person, per day (EPA, 2023a). Obviously the amount of garbage the U.S. is producing has increased substantially over the last 70 years. This waste is usually categorized as one of the following: municipal solid waste, special waste, or hazardous waste, with certain considerations for the disposal of each (Frumkin, 2016). But once it is removed from household or industrial trash bins, it doesn't just disappear. What do we do with it? Do we store it somewhere? Recover it and use it to make other products? Pay another country to take it? And what is the effect of all of this refuse on the environment and the planet as a whole?



Figure 7.9.1: Trash Day - Arlington, Massachusetts, USA. Left to right: recycling, compost, trash, yard waste. (Copyright; Daderot, CC0, via Wikimedia Commons, June 2023.)

San Francisco has set the goal of becoming a "zero waste city" -- with nothing or almost nothing going to landfills. While we haven't reached this goal yet, San Francisco recycles and composts more waste than any other city in the US! See this short news story from CBS to learn more about San Francisco's waste management program. As you learn more about waste management in the following pages, you can refer back to this example from San Francisco.

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7.9.1: Types of Trash/Municipal Waste

7.9.2: Recycling and Composting

7.9.3: Sanitary Landfills and Combustion

7.9.4: Hazardous Waste, RCRA and CERCLA

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7.9.1: Types of Trash/Municipal Waste

Garbage is categorized as municipal solid waste (MSW), special waste, or hazardous waste according to specific characteristics. MSW includes nearly all household trash: paper, plastic, glass, aluminum, food scraps, textiles (old clothing etc.), yard trimmings, and wood (Frumkin, 2016). But this trash generated by homes, businesses and schools actually accounts for only about 2-5% of the total amount of waste products produced in the U.S. (Seabert et al., 2021). Special waste accounts for almost anything that isn't the typical household waste but also doesn't fall into the hazardous waste category. This includes:

- Medical waste: medical devices, syringes, sharps, blood-soaked bandages, gloves, gowns - anything that comes in contact with blood or bodily fluids. This must be disposed of separately to general MSW in order to protect workers from contracting infectious diseases. Typically this waste is incinerated before being disposed of along with MSW (Frumkin, 2016).
- Construction debris: any building materials (other than asbestos), such as drywall, wood, metal, tile, cement etc. are typically disposed of at special construction waste sites or along with MSW. Asbestos has to be carefully removed and disposed of in order to prevent inhalation which can cause cancers and other lung diseases such as mesothelioma (EPA, 2013a).
- Mining waste: which can be liquids or fine, ground up rocks called "tailings", which can contain heavy metals and byproducts from mining such as sulfuric acid or cyanide. If mining waste storage dams break they can wreak havoc and cause damage to the local environment, or release toxic substances into rivers and lakes (*Tailings*, 2017).
- Agricultural waste: solid animal waste or runoff from farms may include pesticides, pathogens, or antibiotics (which may encourage antibiotic resistant microbes) (Frumkin, 2016). Growing and processing grains, legumes, fruit and vegetable products also generates plant waste, which could be useful for biofuels or compost (Sadh et al., 2018).
- Radioactive waste: may include the nuclear fuel and waste products or clothing and protective gear that has come in contact with it. While the U.S. struggles to find a permanent solution for disposing of nuclear waste (high-level radioactive waste), the less dangerous, low-level reactive waste is typically disposed of in special landfills (Frumkin, 2016).
- Sewage sludge: is typically separated from wastewater as part of the treatment process, and chemically treated to remove pathogens. These solids are either put in landfills or used in agriculture as fertilizer (Frumkin, 2016).
- eWaste (electronic waste): includes computers, phones, printers, televisions, gaming devices, or anything with electronic components that are non working or obsolete. These may still contain valuable materials that can be extracted and recycled, but if disposed of improperly can leach heavy metals into the environment (Seabert et al., 2021).

The best solution for waste is simply not to make it in the first place. For example, offices can convert to modern technology and use electronic communications and documents (such as email and electronic signatures) to reduce paper waste production. Food production companies can utilize less plastic packaging. Companies that ship products can combine shipments and reduce unnecessary paper and cardboard use. Reducing the production of waste would be the best option, followed by recycling or recovering "waste" to be reused for other purposes. For example, old tires can be broken down into crumb rubber and used to make playground equipment, truck bed liners, and other products that benefit from the elasticity of the rubber (Frumkin, 2016). Some waste can be used to generate energy through combustion, or the conversion of food waste into compost or animal feed. If nothing more can be used from the waste or if it is too hazardous to keep around, then treatment and proper disposal are the only other options (EPA, 2018). See Fig. \{7{.}9{.}1{.}\eatSpaces{1} \endSpaces}\ below for a diagram of the waste management hierarchy.

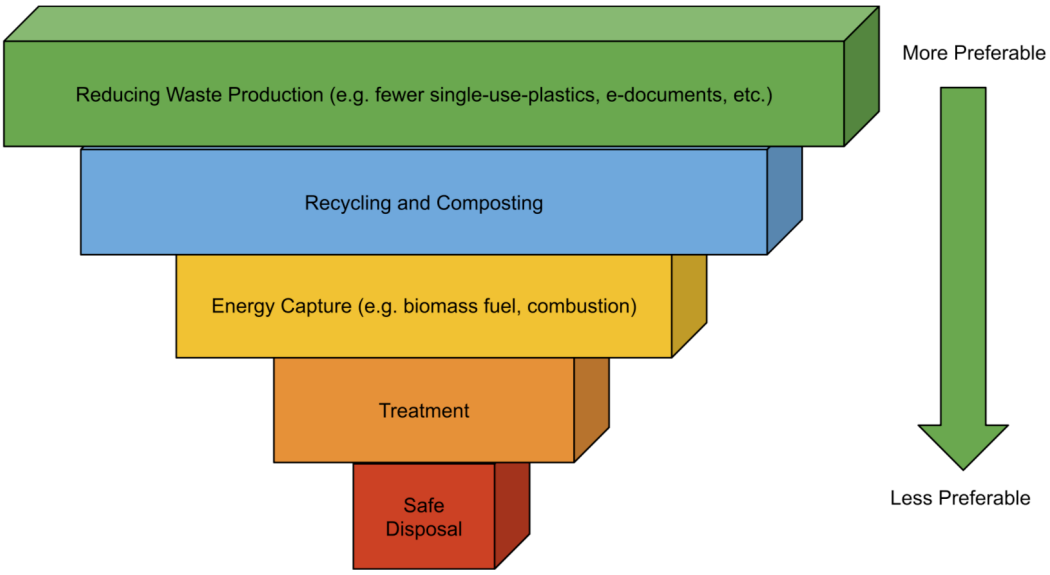


Figure 7.9.1.1: Waste Management Hierarchy. Adapted from https://www.epa.gov/trinationalanalysis/waste-management.

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7.9.2: Recycling and Composting

In 2018, the United States generated 292.4 million tons of MSW, and recycled or composted 94 million tons of it - amounting to about 32.1% of the total. While some other methods were also used to recover energy or create animal feed, over ½ of all waste still ended up in a landfill. While this may not seem like progress, the amount of MSW discarded in landfills has remained relatively constant since 1990 - in spite of population growth - while other methods like recycling and composting have grown (EPA, 2023a). While metals (like steel and aluminum), glass and paper products (including cardboard), are relatively easy to recycle, plastics are much less commonly recycled. Approximately 9% of the world's plastic containers, bottles, bags and other materials are recycled; 50% end up in landfills, another 20% are mismanaged (burned or dumped, potentially ending up in lakes and rivers), and 0.5% end up in the ocean (Ritchie et al., 2023). See Fig. 7.9.2.1 below.

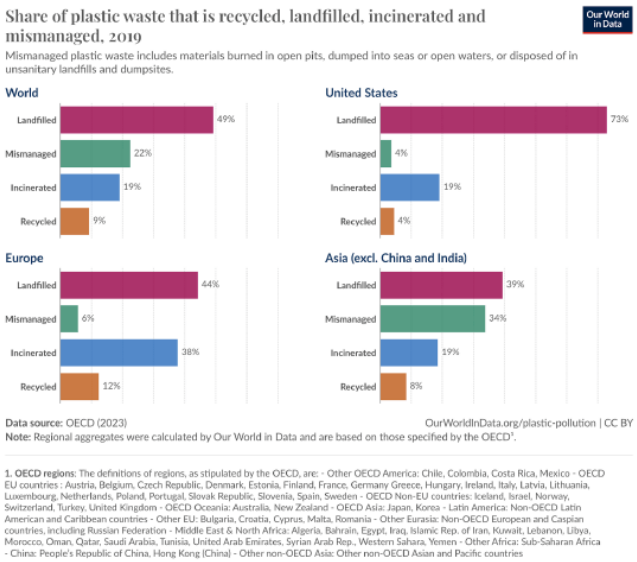


Figure1 7.9.2.1: Plastic Pollution.. (Copyright; CC-BY OurWorldInData.org/plastic-pollution)

Plastic pollution is particularly hazardous because of the characteristics of plastic that make it so desirable. Plastic is durable, and doesn't break down easily. It may take a plastic water bottle floating in the ocean nearly 450 years to decompose (Harris, 2023), broken down by UV rays into smaller and smaller pieces called microplastics. The **Great Pacific Garbage Patch** is really a misnomer because it's not an island or "patch" of trash floating in the Pacific Ocean: much of the plastic pollution is microplastics, swirling around the ocean currents like a plastic soup (Evers, 2024). These microplastics can get into our food and water sources, be ingested by birds and fish, and make their way up the food chain into human tissues. Microplastics have been found in the human gastrointestinal tract and in placental tissue (Ragusa et al., 2021). We may even be breathing in microplastics in the air, which can get into lungs and eventually the bloodstream. Exposure to microplastics and the chemicals that make them could have profound effects on human health, particularly in the immune system response to plastic toxins, chronic inflammation, and a myriad of other subsequent health problems (Prata et al., 2020). The best way to manage plastic waste is not to rely on recycling, but to produce less of it in the first place.

Composting is another way to manage biodegradable waste such as food waste. In the U.S., it is estimated that 30-40% of the food supply ends up as waste - much of that at the retail or consumer level (USDA, n.d.). Food waste may include inedible food scraps such as eggshells or fruit rinds, but it also includes food that could have been consumed but perhaps was spoiled or uneaten. Not only does the food wasted cost energy to grow and transport, it also produces methane gas while decomposing in a landfill - contributing to GHG production and climate change. Food waste can be reduced at the retail and consumer levels by only producing and purchasing what is needed, donating leftover food and preventing spoilage. Composting is also a much better use of food waste, as it produces usable fertilizer for agricultural and landscaping purposes (EPA, 2015). While backyard composting can support a home garden, industrial or large-scale composting has much greater potential for managing food waste, yard waste, sludge and other agricultural or industrial wastes. Bacteria and fungi feed off of the waste products, creating heat which destroys undesirable microbes and weed seeds, and turns the solids into excellent fertilizer for plants. When those raw materials are chipped up into smaller pieces, combined in appropriate ratios, and well-aerated, the composting process can be completed more quickly and produce high-quality soil amendment (Sherman, 2020). As of 2022, California requires that organics

be disposed of separately to recyclables and MSW in order to be composted or used to generate biofuel (CalRecycle, 2024).

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7.9.3: Sanitary Landfills and Combustion

Much of the trash we produce ends up in landfills, which are essentially encapsulated and buried under layers of dirt. In order to protect groundwater and surface water from potentially toxic **leachate** - liquids that accrue from the decomposition of waste - the sanitary landfill needs to be lined with plastic and have adequate drainage. The leachate may be collected and treated before it too is stored. Additionally, decomposition of waste produces gasses and heat - which can cause emissions or even catch fire if not properly vented. Sometimes the methane produced by a landfill can be collected, treated, and used for energy. After waste is dumped into the landfill, it needs to be covered with soil in order to prevent pests (rodents, birds, or insects) from getting into it or the wind from blowing it out of the landfill (Frumkin, 2016). It may seem obvious that landfills are limited by capacity and location: no one wants to live near a landfill, and what should be done once the landfill is full?

Combustion of waste is another option. Although open incineration of trash was often practiced in backyards up until the mid 20th century, this practice creates high levels of pollution - particulate matter and GHGs - that pose a risk to the community and planet. The Clean Air Act of 1970 essentially put an end to this practice in the U.S., although it is still common in other developing countries. Incinerators in the U.S. can be used to produce energy and get rid of waste, but they must have expensive technology to reduce air pollution. The resulting ash can also become problematic to dispose of (Frumkin, 2016, Seabert et al., 2021).

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7.9.4: Hazardous Waste, RCRA and CERCLA

Hazardous waste is typically industrially-produced waste that is ignitable, corrosive, reactive, or toxic; meeting specific criteria established by the EPA. Two key federal laws regulate hazardous waste: the Resource Conservation and Recovery Act (RCRA, 1976) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, 1980), also known as the "Superfund". The first, RCRA, gave the EPA authority for regulating both hazardous and solid waste management, including setting standards for sanitary landfills. It requires tracking of hazardous materials from "cradle to grave", or from production, to transportation, use, and eventually disposal and treatment (Frumkin, 2016). The most common method for disposing of hazardous waste is underground injection, where hazardous waste is deposited into deep wells in the ground. Care must be taken, however, that groundwater aquifers are protected (Seabert et al., 2021). The second law, CERCLA, set up a fund to address already existing hazardous waste sites that had been abandoned, and created the ATSDR (see Clean Air, above). To create this fund, taxes are levied on the industries most commonly responsible which produce petroleum and other toxic chemicals. If the polluter can be found, they are held responsible for paying for the cleanup, but if not, then the superfund does. The EPA has identified over 300,000 waste sites, but only about 2,000 of them were deemed hazardous enough to go on the National Priority List (NPL) and be targeted for cleanup (Frumkin, 2016, Seabert et al., 2021). As of June, 2024, the current list has 1340 sites, 457 deleted sites (where cleanup and remediation has been completed), and 39 proposed sites to be added to the NPL (EPA, 2024).

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7.10: Food and Drug Safety

Long before the CWA and SDWA, the U.S. government recognized the need to regulate food and drug safety. The United States Department of Agriculture (USDA) was established by President Abraham Lincoln in 1862. In 1906 the Pure Food and Drugs Act was passed, requiring accurate labeling of food, drug, cosmetic and liquor products. The same year, the Federal Meat Inspection Act required that meat was processed in sanitary facilities - tasking the USDA with inspecting and enforcing these requirements. In 1938, congress passed the Federal Food, Drug and Cosmetic Act, which gave the newly rebranded Food and Drug Administration (FDA) the responsibility of establishing food safety standards (USDA, 2018). Today, the USDA is responsible for meat and dairy products, the EPA governs pesticides and fertilizers, and the FDA takes care of the remaining food products, drugs, and cosmetics.

Food borne disease outbreaks are defined as 2 or more cases of a similar illness that results from eating a particular food. Foodborne illnesses are typically caused by pathogens like bacteria, viruses, or other parasites that have gotten into the food source - often due to water or equipment contamination, unsafe cooking or serving practices (like failing to cook food thoroughly or leaving at room temperature for too long), or behaviors (such as failure of staff to wash hands). Pasteurization of dairy products is highly protective against bacterial outbreaks in dairy, and the sale of “raw” milk is illegal for this reason (Seabert et al., 2021). Although rare, there is also the possibility for intentional poisoning or bioterrorism, as happened in 1984 when a religious cult in Oregon intentionally contaminated a local city’s salad bars and water supply with *Salmonella* bacteria (Oh, 2017). Local and state public health agencies are typically responsible for investigating foodborne illness outbreaks, but they work closely with the USDA and FDA inspectors (Seabert et al., 2021). While Hollywood has perpetuated an image of the ill-tempered health inspector threatening to close down a beloved restaurant, these public servants actually protect the public from a plethora of potentially deadly disease outbreaks.

Pesticides are any materials used to kill, repel, or change the behavior of a pest that could potentially harm humans. This includes herbicides (which kill unwanted plants, or weeds), insecticides (which kill insects), fungicides (which kill fungi), rodenticides (which kill rodents), and even antimicrobials (which kill bacteria and viruses) (Frumkin, 2016). Technically, a pest is any animal, insect, or plant that poses a threat to humans - everything from the mosquitos that transmit malaria, to cockroaches in a kitchen, to rats in subway stations, or dandelion weeds in a front lawn. Pesticides must often be used with other tactics (like barriers for example) in order to prevent resistance developing in the target pest.

Pesticides can be either synthetic (man-made), or naturally-derived. Some synthetic pesticides have been found to have acute and chronic neurotoxic effects, and tend to linger in the environment (like DDT, which was banned in 1972) (EPA, 1972). Just because a pesticide is naturally-derived does not make it safe - arsenic and nicotine sulfate are naturally derived but are very toxic. In agricultural practice, the USDA regulates pesticides which can be used for conventional and organic agriculture. While conventional growers can use synthetic or natural pesticides, organic producers must only use products from a list published by the Organic Materials Review Institute (OMRI), which are mostly natural in origin, with a few exceptions (Andrews & Rose, 2018).

Most exposure to pesticides falls into two categories: residential and occupational. Residential exposure occurs when pesticides are used to prevent insects, rodents, or weeds around the home or yard. These can cause accidental poisoning (particularly in children), and are sometimes used in intentional poisoning (suicide/homicide) attempts. Occupational risk is highest for agricultural workers who administer the pesticide, and thus have more concentrated exposure. They may also expose family members if the pesticide lingers on clothing or materials brought home (Frumkin, 2016). As with any substance, the dose makes the poison, so amount and duration of exposure are important variables in identifying the toxicity of a substance. The EPA has categories of pesticides based on their toxicity levels with the following labels:

- Caution = relatively low toxicity.
- Warning = moderate toxicity.
- Danger = high toxicity (Frumkin, 2016, Andrews & Rose, 2018).

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7.11: OCCUPATIONAL HEALTH CONCERNS

Occupational health "is an area of work in public health to promote and maintain highest degree of physical, mental and social well-being of workers in all occupations." (WHO. 2025). Occupational health workers aim to prevent physical and psychological illness on the job, as well as to prevent injuries. As you can see, this is quite a broad topic, and more than we can cover on one page. Here we will look at some connections between occupational health and environmental health. Later, in the chapter on injury prevention, we will take a closer look preventing injuries on the job.

Biological, chemical, and physical hazards on a job site can contribute to worker illness. Perhaps the most iconic example is black lung disease -- a disease common among coal miners who inhale coal dust and other minerals, greatly affecting their respiratory health and often shortening their lives.

The same principles of risk assessment for environmental health apply to risk assessment for occupational health -- it's just more focused on the workplace. Public health workers focused on occupational health would scan for dangers in the indoor air in the workplace, in the water (if relevant), and in exposures to hazardous waste or other dangerous substances.

The next two pages highlight some key occupational health policy to protect worker health -- improvements that were often won through the collective power of unions, as well as through public health action -- and a brief overview of common occupational illnesses and injuries.

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7.11.1: Occupational Health Policy

7.11.2: Workplace Injuries and Illnesses

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7.11.1: Occupational Health Policy

Occupational health hazards have been recognized since antiquity, but it wasn't until the industrial revolution that there was widespread awareness of the need to regulate workplaces. Initially these efforts were based on sanitation, cleanliness, and reducing worker injuries - which were common in many factories (Seabert et al., 2021). After decades of industrial tragedies including deaths nearly every other day in steel mills, a plethora of coal mine accidents, the Triangle Shirtwaist factory fire, the Hawk's Nest Tunnel disaster, and others, worker's unions and environmentalists worked together to lobby congress for worker's protections in the 1960's (Frumkin, 2016). The Occupational Safety and Health Act (OSH Act) has only been around for just over 50 years, as it was signed into law by President Richard Nixon in 1970. It began by setting standards for worker exposure to specific environmental hazards, such as asbestos, lead, and cotton dust. Since then more standards have been established to protect workers from injuries, bloodborne pathogens, and other environmental toxins (OSHA, n.d. -b). The OSH Act also established the Occupational Safety and Health Administration (OSHA) to set and enforce these standards, and the National Institute for Occupational Safety and Health (NIOSH) to conduct research and make recommendations for these health standards (Seabert et al., 2021). Because of these laws and oversight agencies, it is widely accepted that employers are responsible for providing "safe workplaces, free of recognized serious hazards" (Frumkin, 2016).



Figure 7.11.1.1: Hydraulic fracking operation at night. (CDC/ Theresa Roebuck, 2016)

"This 2016 image depicted the process of hydraulic fracturing, or fracking, a 24/7 activity, and showed how the need for occupational health and safety never stops. NIOSH researchers from the Western States Division, and the Division of Applied Research and Technology, were the first to systematically document hazardous exposures to workers at fracking sites, including exposures to respirable crystalline silica (RCS), diesel particulate matter, and volatile organic compounds. This sand mover operator was monitoring the sand level in the blender tub, framed in the bottom left handrail. His half-face cartridge respirator may not have been providing a high enough assigned protection factor to protect him from the elevated concentration of RCS, to which he was exposed. This photograph was taken in Encinal, Texas, during a test of a NIOSH-developed engineering control, known as the NIOSH mini-baghouse retrofit assembly, installed to reduce RCS emissions."

Prior to the industrial revolution, common law principles held the worker at fault for any injuries they received while on the job, and some employers went so far as to require "death contracts" as an acknowledgement of the employee of the potential dangers - and perhaps deadliness - of their work. In the late 19th century, Prussia was the first country to create worker's liability and insurance laws in an effort to maintain the loyalty of the working class while squashing Marxist and socialist political movements. Other European countries and the U.S. followed suit, although it took until 1948 for the last state to enact worker's compensation laws. While these laws did provide for monetary compensation in the form of employer-funded insurance policies, they also protected the companies from the threat of lawsuits (Guyton, 1999). Currently, each state in the U.S. has its own worker's compensation system, rules, and regulations, which may cover or exclude certain injuries or illnesses (Frumkin, 2016). Notably, in many states, agricultural employers are exempt from the requirements to provide workers' compensation, even though agricultural work is some of the most dangerous. Fourteen states (including California) do require workers' compensation for agricultural

businesses, and enforce penalties for non-compliance (Mikolajczyk, 2022).

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7.11.2: Workplace Injuries and Illnesses

Workplace injuries include both relatively minor injuries like cuts or bruises, and major injuries like amputations, fractures, loss of an eye, or severe burns and acute poisoning. Non-fatal injuries are most commonly slips, trips, and falls, or contact with equipment (CDC/NIOSH, 2022). Motor vehicle accidents are the most common source of fatal workplace injuries, but deaths from violence and unintentional overdoses have also increased over the last several years (BLS, 2023). In 2022, workplace injuries and deaths in the U.S. had a price tag of 167 billion dollars; including the lost productivity, medical expenses, and administrative costs. Compared to the number of people in the workforce, that's just over $1000 per worker. There were also 108 million days of work lost to injuries that happened in 2022 or in years prior (National Safety Council, 2024a).

Workplace illnesses are often more difficult to connect to workplace exposures since symptoms can often take many years to develop. These include skin diseases, loss of hearing from industry noise, or cancers developed from exposure to environmental toxins used in industrial processes. Workplace-related respiratory conditions include (among others) silicosis - which is developed from inhaling silica dust commonly from grinding or sanding rocks or cement, coal worker's pneumoconiosis - aka black lung disease, and asbestosis - caused by inhaling asbestos fibers (Seabert et al., 2021). Those working outdoors such as farmers, construction workers, and firefighters are also at higher risk for heat-related illness such as heat stroke and heat exhaustion - particularly in the summer months (Riley et al., 2018).

In 2022, the BLS reported 5,486 fatal work injuries, an increase of 5.7% from 2021. The BLS also reported 2.8 million nonfatal work-related injuries and illnesses in private industry, up 7.5% from 2021. Including government jobs as well, the rate of nonfatal injury and illness was 3% of all workers for 2022 (BLS, 2023a). The highest rates of nonfatal work-related injuries and illnesses were found in transportation and warehousing, as well as agriculture, forestry, fishing and hunting. The highest total numbers of nonfatal injuries and illnesses were recorded for the healthcare and social assistance sector however, likely due to the high number of workers employed in those occupations. See Fig. 7.11.2.1 below.

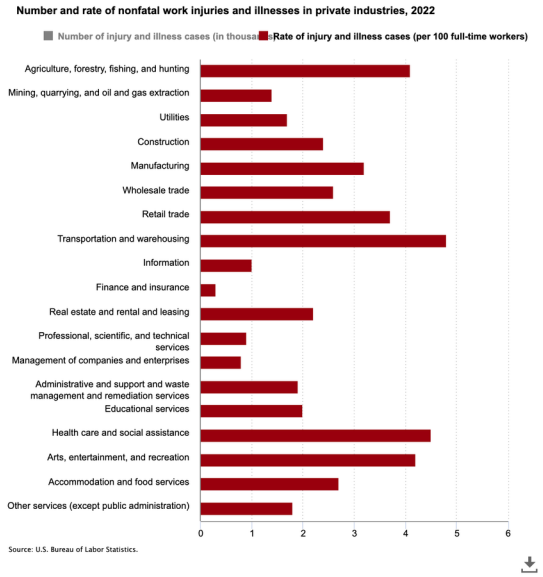


Figure 7.11.2.1: Rate of nonfatal injuries and illnesses (per 100 full-time workers), by private industries, 2022.(CC0, U.S. Bureau of Labor Statistics.)

According to the BLS, the fatal injury rate in 2022 was 3.7 per 100,000 full-time equivalent (FTE) workers. However, this rate was higher for African American or Black workers (4.2 per 100,000 FTE workers) and Hispanic or Latino workers (4.6 per 100,000 FTE workers). Those between the ages of 55-64 have the highest number of fatalities (BLS, 2023b). These demographic differences may indicate disparities in exposures to hazards, or perhaps a lack of protections in certain sectors of industry.

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7.12: Climate Change and Environmental Health

The changes to climate due to carbon pollution (CO_2, methane and other so-called "greenhouse gasses") create a number of hazards to human health. This is a pressing concern within the field of environmental health.

Here is a short video explanation of climate change, from National Geographic:

In the following pages, you will read about climate's connection to health:

- What is climate change
- Climate's effects on health
- Prevention climate change and adapting to climate change
- Co-benefits of action on climate change
- Climate policies

Research about climate change:

Over the years, there have been a number of reliable scientific reports about climate change, ranging from individual research studies in journals, to comprehensive assessments of risk conducted by the US government, to international reports under the auspices of the UN. You might find it beneficial to browse through these resources.

USA, 2024: The Fifth National Climate Assessment.

Under the United Nations: The Intergovernmental Panel on Climate Change (which has issued a number of reports).

American Public Health Association: Hub for climate, health, and equity.

These resources offer a glimpse of the variety of effects of climate change on health, including

- Heat-related illness
- Spread of vectors (mosquitoes, ticks, etc.) and infectious diseases
- Air pollution and particulate matter
- Water-borne diseases
- Changes in the food supply
- Extreme weather and disasters (floods, fires, storms, etc.)
- Mental health effects

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7.13: Climate Change

One of the most pressing concerns in environmental health is the effects of climate change on the planet, and human and animal populations. **Climate change** refers to the shifts in climate over time in various regions across the globe. Many of these shifts are due to **global warming**, or the observable increase in average temperature of the earth. The term “global warming” sometimes causes confusion because people think it means all temperatures will be higher throughout the year. Instead, it’s better to think of global warming as the driver of climate change, because the increasing average global temperature is causing shifts to different regional climates across the globe - including more severe storms, droughts, and permanent changes to ecosystems.

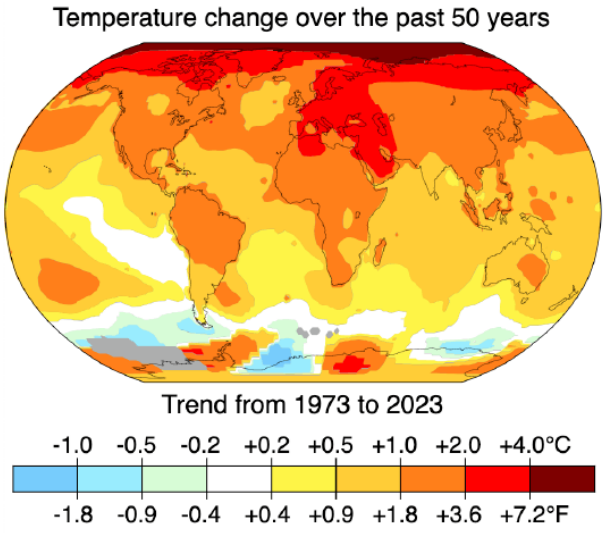


Figure 7.13.1: Change in Average Temperature With Fahrenheit. (Copyright; CC0, NASA’s Scientific Visualization Studio, Key and Title by uploader

How do we know that the earth is warming? Evidence from ice cores collected from Greenland and Antarctica, plus ambient temperature data collected since 1958 demonstrate that although the earth has gone through cycles of warming and ice ages, human activity since the industrial revolution has caused much more warming in the last 150 years than occurred in the ~800,000 years prior. Images from space show ice sheets and glaciers melting and shrinking, dumping fresh water into the ocean. And since the middle of the last century, scientists have tracked a 2 °F increase in the average temperature of the planet, with the most significant increase happening in the last 4 decades (NASA, 2024).



Figure 7.13.2: Melting Canadian glacier. (Katherine Lean, CDC/ CDC Connects, 2017.)

This glacier located along the Icefields Parkway, near Banff National Park, Canada, is melting, showcasing the effect global climate change is having on the environment. The glaciers in this area have been studied since the 1950s, making them some of the longest scientifically observed glaciers in the world. Photo Credit:

This most recent and rapid global warming is considered to be **anthropogenic** (caused by human activity), not something that would typically happen from natural sources alone. Anthropogenic factors include the release of **Greenhouse Gasses (GHG)**. These GHGs include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O),and are released into the atmosphere from the burning of fossil fuels for energy, as well as from modern agricultural practices. Trees actually remove CO_2 from the atmosphere and store it in their trunks - so forests become “carbon sinks”. Deforestation therefore also contributes to global warming by cutting into carbon sinks - thus decreasing the amount of CO_2 collected (Burke & Weill, 2023). These GHGs left floating in the atmosphere trap heat from the sun and reflect it back down to the earth, causing an increase in the average temperature - much like a greenhouse uses glass walls to trap heat from the sun and keep the interior warmer for plants. Since the 1970s, the release of GHGs has increased much faster than in years prior, with the largest spike happening after the turn of the 21st century (Frumkin, 2016). Part of this is due to global population growth, which certainly contributes to the demand for energy production and thus the burning of fossil fuels to make it. However, the largest contributors to GHG tend to be the wealthiest countries, and per-capita GHG emissions are higher for more economically developed countries than for less economically developed countries. So it’s not just that more people require more energy, it’s also the behaviors and demands of wealthy societies that are driving GHG emissions. Still, as a few countries like Germany and the Netherlands have demonstrated, quality of life can be maintained while reducing GHG emissions through the use of technology and renewable energy sources (Ritchie & Roser, 2020). See figures 7.13.3 and 7.13.4 below.

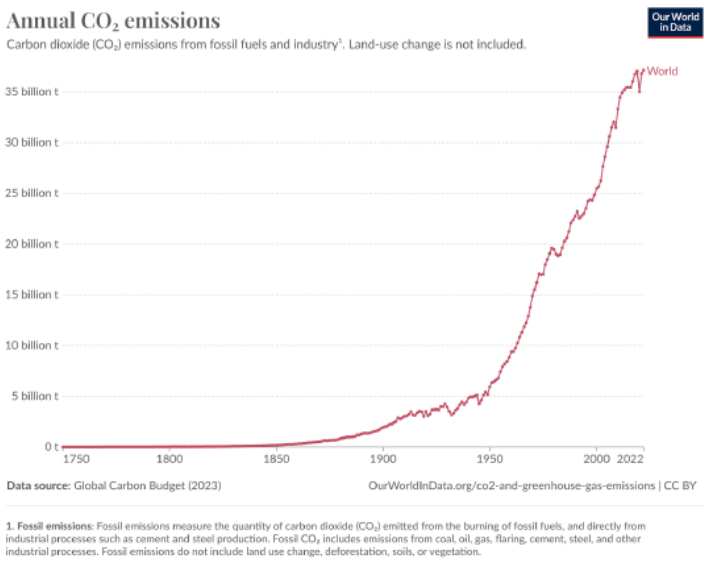


Figure 7.13.3: Annual CO_2 emissions from fossil fuels and industry. (Copyright; CC-BY Our World in Data)

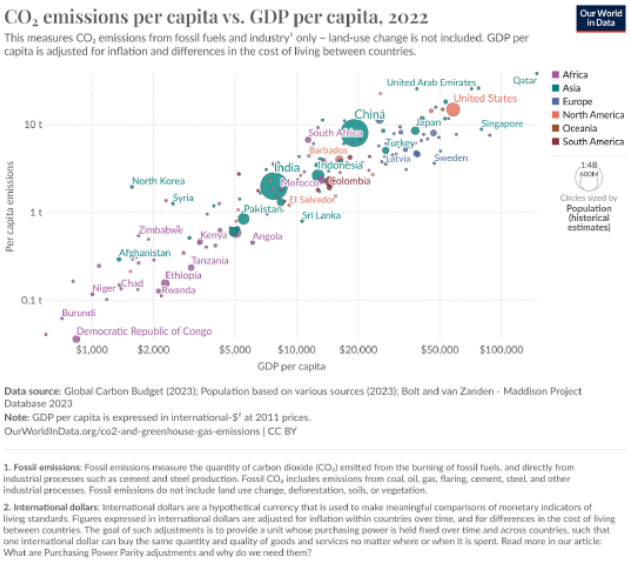


Figure 7.13.4: CO_2 emissions per capita vs. gross domestic product (GDP) per capita. (Copyright; CC-BY Our World in Data)

Increasing the Earth's average surface temperature has several consequences. When the ocean warms even just a little, it expands. As ice sheets and glaciers on land melt, they also contribute to rising sea levels. (Melting icebergs don't contribute to increased sea levels, as their volume is already accounted for - like ice cubes in a glass of water). Increases in ocean temperature can cause the "bleaching" of coral reefs, essentially killing them and the marine life that rely on them for food and shelter (NOAA, 2023). On land, the higher temperatures cause more evaporation of water from plants and soil, leading to droughts. Warming air can also hold onto more water vapor, which can also cause more extreme weather - like severe rainstorms, hurricanes, and flooding (Frumkin, 2016). As warm air travels toward the poles, it shifts the cold air from the polar vortex (low pressure air at the north and south poles) which can cause severe winter storms - like the unexpected snowstorms experienced in Texas in 2021 which caused massive failures in the power grid (Burke & Weill, 2023). While some rain is needed for vegetation growth, very wet springs followed by dry summers cause all that vegetation to dry out. In 2021 during the summer, dry timber and windy conditions led to mega wildfires in the Sierra Nevada mountains (Sierra Nevada Conservancy, 2022). Droughts can not only dry out plants, but also make the soil less permeable, causing flooding when substantial rains do fall, and allowing precious rainwater to wash away into the ocean instead of sinking into groundwater aquifers (Fry & Reyes-Velarde, 2019). And if heavy rains follow a wildfire, they can cause mudslides that change terrain and threaten homes and roads (Burke & Weill, 2023). .

Climate change might include changes in temperature, rain or snowfall, drought, or wind that influence the overall climate for that region. **Climate** is a term used to describe *average* weather patterns. Southern California for example has a mostly mediterranean

(arid or semi-arid) climate around the coastal cities and Los Angeles, gradually shifting to a desert climate in the Mojave desert and inland regions. Los Angeles has pretty mild temperature changes over the seasons, with some rainfall in the winter, and dry, sunny summers. The desert areas get much less rain of course, and have more temperature extremes, getting hotter in the summer and colder in the winter. **Weather** is made up of the temperature, atmospheric pressure, precipitation, wind, and humidity at any given time and can change rapidly. Certain weather patterns may be predictable for a particular climate, but the two are not the same by definition. Over time, if the climate changes in a specific area, there may be more extreme weather patterns, and there will be changes in the overall ecology of that region - which may positively or negatively influence its ability to support life of the plants and animals who live there (Burke & Weill, 2023).

In our California example, the average temperature in the Los Angeles (LA) region has already increased since the middle of the 20th century, and is expected to be 4-5 °F warmer by the middle of the century. This increase in temperature is causing more of the snowpack to melt from the nearby mountains, and more of the water sources across the state to evaporate. The combination of warm, dry summers and substantial rainstorms in the winter will cause more vegetation to grow in the spring and become dry, wildfire fuel in the summer. Subsequent rains will increase the risk of mudslides and soil erosion. Along the coast, higher sea levels will threaten coastal communities, which, along with mudslides can cause severe danger to lives and homes (California Climate Adaptation Strategy, 2024). Central California has a mediterranean climate similar to LA, which is conducive to growing fruit and nut orchards and crops that require rain in the winter and warm sun in the summer. If the entire climate in central CA becomes more desert-like, it will severely impact the state's large agricultural economy. For example, almond orchards in CA produce 80% of the world's almonds - but these trees require many years to mature and need water year round (Chea, 2021).

The distinction between **climate** and **weather** is an important one. Climate is the average of weather conditions (temperature, rainfall, etc.) over a 30-year period. Weather is what we call the atmospheric conditions at any given moment -- sun, rain, heat, snow, etc. The focus on climate over weather in studying what's happening on earth is akin to public health's focus on population health over individual health. For example, a 5% increase in the number of days an individual misses work or school due to illness might not be a big deal -- but a 5% increase across a population is a very big deal. Similarly, while any given day in San Francisco the temperature goes up or down 2 degrees Celcius (about 5 degrees Fahrenheit) and no one thinks twice, when the climate heats up by 2 degrees Celsius, it is a very big deal indeed.

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7.14: The Health Effects of Climate Change

As global warming causes a cascade of climate changes and weather pattern disruptions, these too cause changes to the ecological systems in which we live, which in turn affect human health. Besides the dangers of extreme weather events, which can be deadly on their own, climate change will affect both physical and human health in many ways. According to the most recent (5th) National Climate Assessment from the U.S. Global Change Research Program:

Health risks from a changing climate include higher rates of heat-related morbidity and mortality; increases in the geographic range of some infectious diseases; greater exposure to poor air quality; increases in some adverse pregnancy outcomes; higher rates of pulmonary, neurological, and cardiovascular diseases; and worsening mental health (USGCRP, 2023b)

And these risks to health are not equal across America or across the globe. Social determinants of health also influence which populations will be at higher risk for experiencing the health effects of climate change, with the most severe impacts being felt by communities and countries with less wealth, fewer resources, less education, and those historically marginalized by the rest of society. Even within relatively wealthy countries, the populations most at risk include the elderly, unhoused, children, pregnant people, and those with chronic conditions and disabilities (USGCRP, 2023b).

While warmer temperatures in some areas actually increase the capacity to grow food, they can harm crops and farmers in other regions, and disrupt the food supply chain. The northern regions in Siberia (Russia) and Canada are now warm enough to grow crops that would not have survived before (like soy and wheat), but South Asia, South America, and Africa will experience significant losses to dietary staples (wheat, corn, etc.). Warmer weather also encourages the growth of pests, fungi, and other plant diseases, causing more crop losses (Frumkin, 2016). Warmer ocean temperatures threaten fish and shellfish, which are important sources of protein for many Indigenous communities (USGCRP, 2023b). And although CO_2 can be removed from the air by certain trees and plants, it can also change the nutrient content in some food sources like rice and soybeans. Meanwhile, weeds, allergy-producing plants (like ragweed), and poisonous plants (like poison ivy) thrive in the heat and higher CO_2 (Frumkin, 2016). Food insecurity is already high in many of the same places experiencing negative agricultural effects of climate change.

Foodborne, waterborne, and vector borne pathogens are likely to increase with climate change via several pathways. Many bacteria and fungi thrive in warm, humid climates, and many vectors (like mosquitos) breed in standing water. Water sources can be contaminated with runoff from heavy rains and flooding, and can contribute to food contamination via irrigation and washing of plants. Water shortages may also prompt people to turn to other sources of water like nearby lakes and streams, which are more likely to be contaminated with runoff and/or pathogens. And higher temperatures also promote harmful algal blooms (colonies of algae), both in freshwater (lakes) and saltwater (oceans), which can be harmful to humans and other marine organisms. Vectors like mosquitoes and ticks have spread further as other regions warm, bringing with them diseases like malaria, West Nile virus, dengue fever, and chikungunya. Even fungal diseases like Valley Fever are expected to spread north with drought conditions (Frumkin, 2016, USGCRP, 2023).

Many regions are experiencing higher-than average temperatures, and more frequent heat waves, or extreme heat events (EHE). In the summer of 2023, Phoenix experienced a record 31-day streak of temperatures over 110 °F (The Associated Press, 2023). While the American Southwest is not stranger to hot summers, other regions also experienced severe heat waves for which they have little history or preparation. In 2021, the Northwestern states and Canada (typically a cooler, “oceanic” climate) experienced a “heat dome” which caused high temperatures over the summer (Zhang et al., 2023). Similar heatwaves have hit Australia, China, Japan, and Europe (Zachariah et al., 2023), and can be particularly dangerous in regions that aren’t typically prepared for hot summers with air conditioning in buildings and public transportation. EHEs can cause acute heat-related illnesses (HRIs) such as heat exhaustion, dehydration, and heat stroke, and they also increase risks for cardiovascular events and kidney problems in those with chronic diseases like diabetes, as well as health complications for infants and pregnant people.

People most at risk for HRIs are older folks, young children, and pregnant people, as well as those who take certain medications, those who lack housing or air conditioning, and those who work outside. Social determinants of health also impact disparities in HRIs. If folks lack the money to pay for high electric bills, they may not run their air conditioning during the summer months. And poorer, urban communities may actually experience hotter conditions than wealthier suburban neighborhoods. A lack of tree cover/greenspace and more cement can create “urban heat islands” up to 4°F hotter, and less likely to cool down at night. But plants that provide shade and absorb CO_2 need irrigation, which is why wealthier neighborhoods tend to have more of them (Dialesandro et al., 2021, USGCRP, 2023b). See Figure 11.3 below for region-specific climate change effects in the U.S.

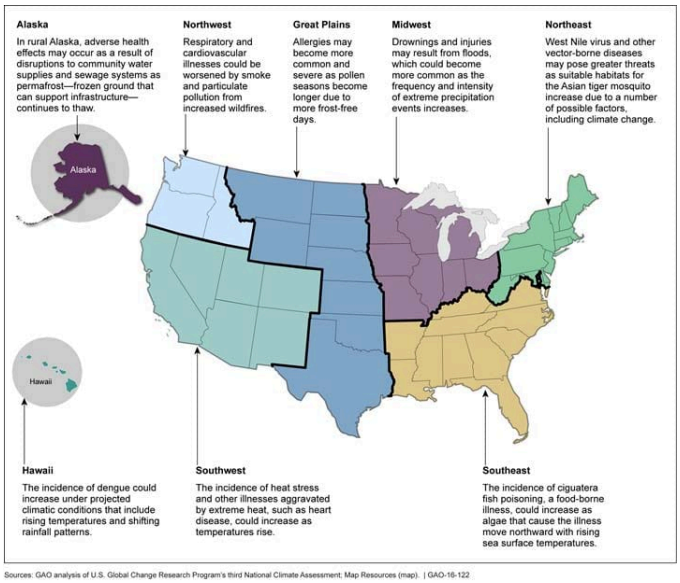


Figure 7.14.1: Examples of Potential Health Impacts from Climate Change in the United States, by Region. U.S. Government Accountability Office from Washington, DC, United States. (Public domain, via Wikimedia Commons. November 10, 2015)

Figure 11.3 Examples of Potential Health Impacts from Climate Change in the United States, by Region. U.S. Government Accountability Office from Washington, DC, United States, Public domain, via Wikimedia Commons. November 10, 2015.

Climate change affects mental health in several ways. People may lose everything in a natural disaster like a hurricane, wildfire, or flood. They may lose friends and family members, pets, photographs, homes and vehicles, and entire communities. They might lose their jobs and livelihoods to a natural disaster, or a change in climate - particularly in agricultural economies. Experiencing environmental trauma can have a severe and long-lasting impact on mental health, often causing post-traumatic stress disorder (PTSD) and heightened anxiety for many years (USGCRP, 2023). Historically minoritized communities and those who have fewer resources to begin with are often those the most harmed. For example in 2005, Hurricane Katrina devastated parts of New Orleans. The areas hardest hit were home to majority Black residents due to historical redlining practices which had segregated homeownership to certain parts of the city. These neighborhoods were below sea level, and so experienced the worst flooding (Burke & Weill, 2023). And the recovery has been just as difficult - nearly 175,000 Black New Orleans residents were displaced, and 75,000 have still not returned almost 2 decades later. Housing costs increased, flood insurance became expensive, and the federal program designed to fund rebuilding efforts ended up being sued for shortchanging poorer recipients and trying to collect overpayments (SPLC, 2023).

What happened after Hurricane Katrina is perhaps a microcosm of the displacement of communities due to climate change. Severe weather and natural disasters may destroy neighborhoods, towns, and even cities, forcing inhabitants to move elsewhere. Likewise, heatwaves and droughts may make agriculture unsustainable in certain regions, forcing people to migrate. Indigenous peoples already experience disparate impacts which threaten traditional ways of life, as well as the destruction of culturally and spiritually significant landscapes (USGCRP, 2023b). These and other socioeconomic impacts threaten civil and international conflict, and will likely disrupt global economies - all of which will have cascading effects on human health. See Fig. 7.14.2 below for a diagram outlining these health effects of climate change.

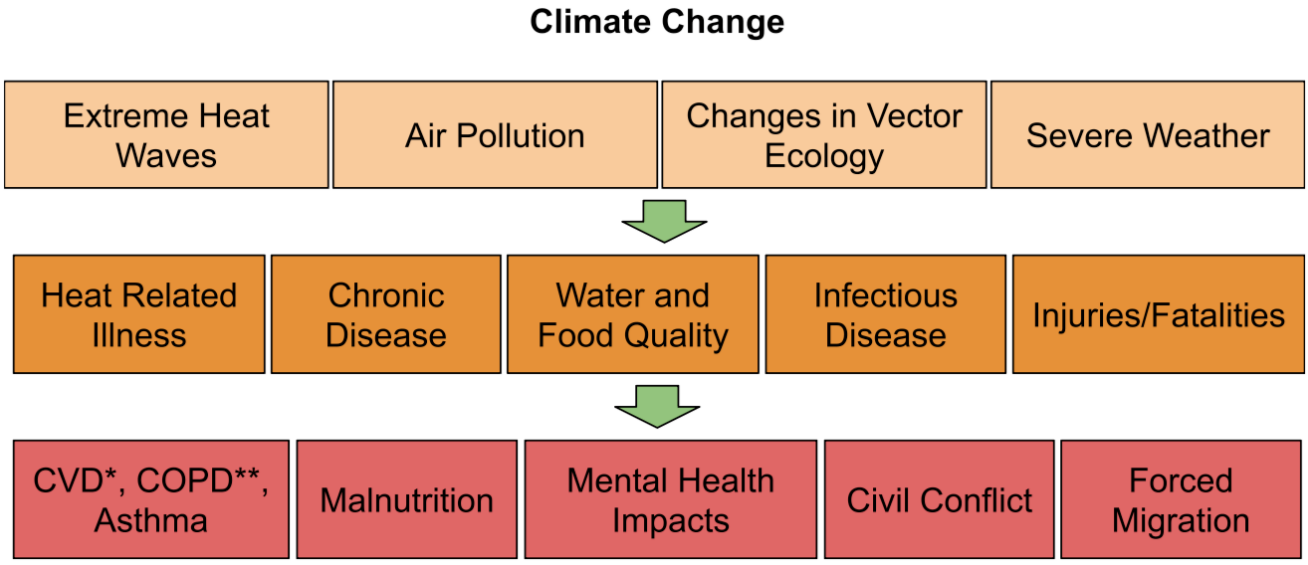


Figure 7.14.2: Health Effects of Climate Change. *Cardiovascular Disease (CVD). **Chronic Obstructive Pulmonary Disease (COPD).

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7.15: Preventing Climate Change and Adapting to Climate Change

There are (at least) two major approaches to addressing the vast health risks of climate change. Public health professionals play a role in both of these approaches, alongside other scientists, activists and others. Public health voices have been particularly prominent in finding ways to adapt to climate change here in California, for example.

One approach is to try to PREVENT the planet from warming, or from warming as much or as quickly.

- This would include putting less carbon into the air (through alternative energy or reduced use of petroleum products).
- It could include planting trees and gardens, or other ways of capturing carbon from the environment and storing it, to slow the warming of the climate.

Another approach is to ADAPT to the reality of climate change and try to ameliorate or reduce the health effects of this warming.

- This approach is fundamentally different -- although not contradictory (one can support both approaches).
- This approach says, how do we save lives, given that mosquitoes and other vectors are moving into new regions, natural disasters are becoming more common, crops are failing in many parts of the world, and all the other specific ways that the increased variability in the climate are ALREADY impacting health.

As you can imagine, there are MANY things we can do to help our communities be more resilient in the face of one of the greatest creeping threats to human health.

Can you think of more ways we can use ideas, tools, policies or programs that we've seen throughout the semester to help adapt to a changing climate here in California? You might think of things we saw in the Environmental Health chapter, or way back at controlling infectious and noninfectious diseases, or community organizing techniques, or adding the specific health needs of elders -- or any other topic we've touched on this semester. They all can play a part in responding to climate change.

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7.16: Co-Benefits of Taking Steps to Address Climate Change

The "good news" of taking action to reduce (mitigate) climate change and to adapt to a changing climate is that some steps to reduce carbon pollution can improve health in two ways. Obviously, by reducing climate change effects, that is good for human health. But some steps also have co-benefits for health -- side effects that improve health in other ways.

For example, walking or riding a bike avoids the carbon exhaust of driving -- and it is good for circulatory health (heart and arteries), and good for mood.

Eating more vegetables and less meat is good for the planet -- and good for digestion and reducing obesity.

Burning less coal slows climate change -- and also reduces asthma and heart disease associated with soot.

Please watch this short video from the World Health Organization on health action to respond to or prevent climate change, and its co-benefits.

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7.17: CLIMATE CHANGE POLICY

In December of 2015, 196 countries signed the Paris Agreement - a legally binding international treaty to address climate change. This treaty mandates that signatory countries set their own goals to reduce their impact on climate change, while recognizing that low-income countries may need extra funding and support in order to join in climate mitigation efforts to reduce their GHG emissions, as well to adapt to the adverse effects of climate change they are already experiencing. The long-term target of the Paris Agreement is to keep the increase in Earth's average temperature (compared to pre-industrial levels) well below 2 ℃, while pursuing the target of at or below 1.5 ℃ - since warming below 2℃ will still cause substantial climate change impacts like droughts, floods, and extreme storms. The agreement includes nationally determined contributions (NDCs) by each country; commitments to take economy-wide steps to lower GHG emissions (UNFCCC, 2015). As of the early 2020's warming is already at 1.2 ℃, yet if all of the long-term targets for GHG emissions the Paris Agreement were implemented in full and on time, it is possible that warming could be kept at or below that dire 2 ℃ mark by 2100 - but unlikely that warming could be kept under 1.5 ℃. To reach this more aggressive goal, signatory countries would have to move up their net zero emissions targets, cut CO_2 emissions by 45% and other GHG emissions substantially by the year 2030, and support other countries in doing so as well (especially low-income countries) (Meinshausen et al., 2022). Unfortunately, the United States is behind on its NDC of lowering GHG emissions by 50-52% below 2005 levels by 2030, despite positive projections assumed from implementing the Inflation Reduction Act (IRA) and Infrastructure Investment and Jobs Act (IIJA) signed into law by President Joseph Biden. In order to close the gap, the Environmental Protection Agency (EPA) could use the Clean Air Act (see below) to set more aggressive standards for lowering pollution across industries, and the federal government could expand funding for forestry and agricultural incentives to promote mitigation and sequestration (removal of GHGs) (Clean Air Task Force, 2023).

Climate Policy in Recent US Policy

In August 2022, Congress passed the Inflation Reduction Act, which was biggest piece of legislation on climate in decades. It invested more money for addressing climate change and reducing carbon emissions than ever before. Here is a 5-minute video explanation from PBS NewsHour from when the law was new. The goal set the US on track for a 40% reduction in emissions.

However, with elections come many changes to policy. The current Trump Administration has been emphasizing investments and incentives for the gas and oil industries, and rollbacks to many of the climate measures in the Inflation Reduction Act (like incentives to buy electric cars). It is too early to measure the impact of these changes, but it seems likely that the 40% reduction in emissions that was forecase in 2022 will not be reached this decade.

7.17.1: The Paris Agreement

7.17.2: Climate Change Policy in California

7.17.3: Emergency preparedness (whether emergency is climate related or not)

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7.17.1: The Paris Agreement

In December of 2015, 196 countries signed the Paris Agreement - a legally binding international treaty to address climate change. This treaty mandates that signatory countries set their own goals to reduce their impact on climate change, while recognizing that low-income countries may need extra funding and support in order to join in climate mitigation efforts to reduce their GHG emissions, as well to adapt to the adverse effects of climate change they are already experiencing. The long-term target of the Paris Agreement is to keep the increase in Earth's average temperature (compared to pre-industrial levels) well below 2 ℃, while pursuing the target of at or below 1.5 ℃ - since warming below 2℃ will still cause substantial climate change impacts like droughts, floods, and extreme storms. The agreement includes nationally determined contributions (NDCs) by each country; commitments to take economy-wide steps to lower GHG emissions (UNFCCC, 2015). As of the early 2020's warming is already at 1.2 ℃, yet if all of the long-term targets for GHG emissions the Paris Agreement were implemented in full and on time, it is possible that warming could be kept at or below that dire 2 ℃ mark by 2100 - but unlikely that warming could be kept under 1.5 ℃. To reach this more aggressive goal, signatory countries would have to move up their net zero emissions targets, cut CO_2 emissions by 45% and other GHG emissions substantially by the year 2030, and support other countries in doing so as well (especially low-income countries) (Meinshausen et al., 2022). Unfortunately, the United States is behind on its NDC of lowering GHG emissions by 50-52% below 2005 levels by 2030, despite positive projections assumed from implementing the Inflation Reduction Act (IRA) and Infrastructure Investment and Jobs Act (IIJA) signed into law by President Joseph Biden. In order to close the gap, the Environmental Protection Agency (EPA) could use the Clean Air Act (see below) to set more aggressive standards for lowering pollution across industries, and the federal government could expand funding for forestry and agricultural incentives to promote mitigation and sequestration (removal of GHGs) (Clean Air Task Force, 2023).

The United States has been in and out of the Paris Agreement. It was signed during the Obama Administration, then the first Trump Administration withdrew the US from the agreement, then the Biden Administration rejoined, then the second Trump Administration withdrew. This inconsistency may weaken US influence in future climate-related negotiations. US nonparticipation in the Paris Agreement is projected to slow the world's progress toward the goal of no more than a 2° C. rise in temperature of the overall climate, compared with pre-industrial levels, by taking off the table more than a third of the projected reduction in emissions under the Paris Agreement (Larch & Wanner, 2024).

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7.17.2: Climate Change Policy in California

In the state of California (CA), “The 100 Percent Clean Energy Act of 2018,” Senate Bill 100 (SB 100, De León) requires all electricity generation to be produced by zero-carbon sources by 2045, and at least 60% of the state’s electricity should be generated via renewable resources by 2030. Renewable energy resources include solar, wind, geothermal, bioenergy, fuel cells, and existing hydroelectric and nuclear power plants (no new nuclear power plants are to be built). According to the initial multi-agency assessment report, CA will need to triple its current electricity capacity to meet demands, and triple its solar and wind build rate. Battery storage build rates need to increase by nearly 8 times the current rate. These and other considerations to maintain a “flexible” grid will cost nearly $4.6 billion dollars by 2045. Yet, the report is positive that the goal of 100% renewable energy for electricity customers and state agencies is doable by the target year (Gill, Gutierrez, & Weeks, 2021). At the same time, the Clean Air Resources Board also enacted a rule to require all new cars and light trucks sold in CA must be fully electric or plug-in hybrids by 2035. Projections estimate that this will cut GHG emissions from motor vehicles in half by 2040, and substantially reduce cardiopulmonary deaths, emergency room visits, and asthma attacks related to smog for CA residents (CARB, 2022).

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7.17.3: Emergency preparedness (whether emergency is climate related or not)

Public health plays a key role in emergency preparedness for all kinds of disasters -- whether they are climate related or not. The need for a public health role in assessing risks, ensuring the availability of adequate medical resources, and carrying out prevention and intervention strategies seems to get highlighted in each major disaster (natural or human-caused) that occurs.

- The health dangers to the rescue and cleanup crews at the site of the World Trade Center after the September 11, 2001 attacks plus the mysterious anthrax attack through the mail that killed several people and threatened more in Washington, DC pointed to the need for public health expertise in responding to these disasters and planning for future bioterrorism attacks.
- The huge health inequities related to Hurricane Katrina in New Orleans in 2005 revealed the need to attend to vulnerable populations when managing emergencies and, on the prevention end, to involve communities in developing emergency plans that will actually work for them.
- The relative public health success in managing the pandemic of H1N1 flu in 2009-2010 showed that advance planning works -- the death count from this relatively mild but highly contagious flu strain was kept low through rapid public health action (around 284,000 deaths worldwide, according to the World Health Organization, cited by the Mayo Clinic).
- Obviously, the covid-19 pandemic that began in late 2019 and by 2020 was causing major disruptions and deaths worldwide pointed to both the value of emergency planning where it worked to prevent worse outcomes and the shortfalls of existing plans, given that this coronavirus has caused more than 7 million deaths worldwide to date.

Some of the roles that public health organizations can play in emergency preparedness include

- Surveillance. The public health practice of routine monitoring of disease outbreaks can assist in identifying a potential emergency in its earliest stages -- whether the pathogen is naturally occurring or spread through bioterrorism. With climate change, we expact vector-borne diseases (like malaria and dengue) to spread into new regions as mosquitoes, ticks and other disease-carrying animals migrate to newly-warm areas. Surveillance will be key to detecting these outbreaks early.
- Epidemiological and laboratory investigation of pathogens. Epidemiological investigation and analysis can determine the identity, source, and mode of transmission for disease agents (pathogens). Understanding how a disease spreads is essential to developing effective interventions to stop the spread. Laboratory capacity to test rare or unusual agents is not found everywhere -- different laboratories have different specializations -- yet the network of public health laboratories together need to be ready for any emerging threat.
- Risk communications. In an emergency, communication is more vital than ever. Public health communications to the public should be clear, concise, and accurate. When information changes -- as it undoubtedly will -- the change in message to the community must be explained adequately. (Otherwise, the public may be confused or distrust the messages.) Public health can also assist with interagency communication and coordination during an emergency.
- Planning. Involving key stakeholders, including vulnerable communities, in making emergency preparedness plans is a strength of public health planning efforts. Planning can help ensure that emergency medical services and hospital capacity can respond to a health emergency, including providing for the safety of medical personnel. Public health emergency preparedness can include running possible scenarios, establishing action protocols, training personnel, maintaining relationships among partnering agencies, and analyzing the vulnerability of specific communities. Where possible, planning efforts can help vulnerable communities reduce their exposure, for example, reducing the risk of wildfire, preparing cooling stations in advance of heatwaves so vulnerable people have a place to go to cool off, or reducing construction in flood zones.
- Community-wide response. Public health agencies can play a role in coordinating community-wide responses to an emergency, where many different entities are involved.
- Stockpiling supplies. In preparation for pandemic flu, the US, for example, stockpiled antiviral medications effective against the flu. These were not effective against covid, yet may still be a welcome forethought should the avian flu H1N5 evolve to be easily transmitted among humans, a public health nightmare. Stockpiles of masks, respirators, and other supplies is also warranted.

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7.18: Additional Resources

The resources on this page are intended as optional tools for you to review key points of this chapter and/or deepen your knowledge in specific areas.

Overview of the Environment Affects Health

This episode from Crash Coaurse (remember them from Chapter One?) provides a good summary of the environment affects human health, recapping many of the key points in this chapter, including air pollutants, water pollutants, climate change, and environmental justice.

YouTube Video

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More about ozone

Every semester, I've noticed some students get confused about **ozone**! Ozone is a three-atom modecule of oxygen (O_3). We can't use it to breathe (we breathe ithe two-atom version, O_2). Ozone is produced through a variety of industrial processes and also naturally. Having *some* ozone around isn't a threat (remember, "the dose makes the poison.") Having high concentrations of **surface-level ozone** -- meaning, ozone in the air we walk around in at the surface of the earth -- is problematic, though. It increases the risk of many lung diseases and can actually injure our lungs. That's why ozone is a criteria pollutant that the EPA closely monitors -- one of six criteria pollutants that are common and especially important to human health.

But what about the ozone layer? Ozone in the upper atmosphere is very important to protecting humans from harmful radiation from the sun. Ozone in the upper atmosphere is like sunscreen for the planet -- it protects us all from cancer. The upper atmosphere is far from where we walk around breathing, so ozone up there is no threat to human health -- in fact, quite the opposite.

What's the hole in the ozone layer, and what's happening with it? Due to the use of certain chemicals (CFCs) in lots of manufactured products (from hair spray to refrigerators), CFC pollution has caused a breakdown of ozone in the upper atmosphere, especially over Antartica, where a hole in the ozone layer was discovered in the 1980's. **In a rare example of international cooperation on environmental dangers**, every country in the world signed the Montreal Protocol, agreeing to stop using CFCs. The hole in the ozone layer is recovering and is expected to close sometime in the middle of the 2100's. Success is in progress!

You can see more about this through this 2-minute NASA video, or this 8-minute Vox explainer video. Both are OPTIONAL.

YouTube Video

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Is the hole in the ozone layer connected to climate change? Not much! They are two different problems, with different causes. There are a *few* connections between the two, though, which you can read about at this NASA blog post if you are curious.

History of Environmental Health:

This 2011 video offers a historical view of environmental health. Some of the early successes of this branch of public health are ones we take for granted now, yet had a huge impact in their day. This video lacks closed captions -- it is an optional, supplementary resource.

American Public Health Association: Environment • Health • You from Lila Films on Vimeo.

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7.19: References - if not already on each page

The following list of references is for the Environmental Health chapter of Erin Calderone's *Public Health 101*. Significant portions of that book are included in this chapter, and while in general I have placed the references at the bottom of each page, for some pages they can be found in this list instead.

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8: WEIGHT, WEIGHT BIAS, NUTRITION AND PHYSICAL ACTIVITY

This chapter examines **obesity, weight bias, and health.** While public health concern about the rise in obesity is substantial, I also wanted you to be exposed to a lesser-known CONTROVERSY about obesity:

- Is fat an actual cause of the health problems correlated to obesity or not?
- What happens when we focus on the "o-word," obesity, in ways that stigmatize fat people?
- What about the role of *weight bias* or *fat discrimination?*

This chapter also offers some information about improving **access to good nutrition and access to physical activity** -- something that almost all communities need, regardless of weight.

8.1: Learning Outcomes (goals for this module)

8.2: Obesity- A controversy

8.3: Regarding obesity, we have at least two controversies

8.4: Americans have gained weight

8.5: ONE VIEW- Obesity - the most serious health problem of our day!

8.6: Obesity - measurements and impacts

8.7: A DIFFERENT VIEW- Obesity - a manifestation of fat-phobia and a distraction from the real issues!

8.8: What causes obesity? What causes the diseases associated with obesity?

8.9: What is good nutrition?

8.9.1: Nutrition

8.9.2: Nutrition Environment and Services

8.10: Physical Activity

8.10.1: Physical Activity and Fitness

8.10.2: Physical Education and Physical Activity

8.11: Additional Resources

8.12: Additional References - partial list

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8.1: Learning Outcomes (goals for this module)

Whenever chronic diseases are discussed a common theme has been the need for good nutrition and physical activity. Activity and food also play a role in maintaining good mental health, coping with stress, and promoting good immune function. There is some truth to the saying that you are what you eat!



By the end of this section, students will be able to

1. Define and discuss the terminology such as "overweight," "obese," and "Body Mass Index" that are commonly used in discussing the impact of body fat on health.
2. Summarize and critique some of the arguments used on both sides of the "obesity debate," the scientific disagreement about the health impacts of increased size.
3. Formulate an informed opinion regarding the "obesity debate."
4. Describe some of the elements of good nutrition, on both personal and community levels.
5. Define "physical activity" and specific benefits of adequate physical activity.
6. Describe public health strategies for increasing access to good nutrition and physical activity through *community-level changes*.

Several *optional* readings are linked throughout this chapter, as I know this topic is of interest to a lot of you.

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8.2: Obesity- A controversy

You have no doubt read or heard a lot about the "obesity epidemic" in the United States (or worldwide). It seems like the discussion of obesity as a terrible health risk is everywhere. The concern seems to cut across the political spectrum, though different administrations may take different approaches. (You could compare, for example, former First Lady Michelle Obama's influential campaign "Let's Move," with its emphasis on increased physical activity and access to healthy food, to the current campaign of HHS Secretary Robert F. Kennedy, Jr.'s, to remove food dyes and other additives in the food supply.)

Obesity is so commonly discussed, you might not think there's any controversy.

It's not surprising that some of the *recommended remedies* are controversial (Ban fast food? Tax soda? those proposals are definitely controversial!).

There is *also* a controversy about the basic science here. Does the rise in average weight that we have seen over the past 40+ years have a negative impact on health? How much of an impact? How serious of a health problem is body fat, after all? Once someone is fat, is weight loss the best way to improve health? And what are the true causes of the rise in body size?

The majority of the public health world would place their bet on the side (in this controversy) that says obesity is a very serious health issue.

Yet, there is some persuasive evidence that **obesity itself** is not the problem. Rather, poor nutrition, sedentary lifestyles, changes in industrial food production, and other factors may be the *true* causes of changes in population health - not fat or size, per se. In addition, *discrimination* against fat people is an under-researched factor that may explain s*ome* of the poor health outcomes we see in fat people who are inactive. After all, we have seen that racism and other forms of discrimination cause chronic stress that raises cortisol levels, and that's bad for health. The researchers on this second side of the controversy say that **the public health focus on OBESITY may increase that discrimination, harming health**.

Keep in mind, **discrimination doesn't just make people feel bad** - although that's "bad enough." It alters the way plaque builds up in the arteries. It changes the way insulin is produced. It makes a person's resting (sleeping) blood pressure higher. In children, it can impair the development of brain cells. It contributes to chronic disease. It contributes to depression. In an earlier chapter, we viewed the impact of discrimination in relationship to class and race (see Unnatural Causes)- could the same thing be true of persistent and systematic discrimination against fat people?

We can't ignore the fact that in the US, class, race and fat are related. Obesity levels in the US are higher among the less educated and less wealthy, and higher among Latinos, African Americans, Native Americans, and Pacific Islanders than among whites. Obesity is on the rise among some groups of Asian Americans as well, including Filipino/a/x and South Asian populations. When the health risks of obesity are assessed, how are the effects of racism and class disadvantage taken into account, if at all?

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8.3: Regarding obesity, we have at least two controversies

Regarding obesity, I am aware of at least two major controversies:

1. **Is obesity itself (or body fat) dangerous to health, or is obesity just a side effect of *other* health risks like sedentary lifestyle, stress and poor nutrition? Those risks could be addressed to improve health, without necessarily seeing a change in body weight.**
2. **What can we do to improve the health of people who are already fat? Is weight loss the solution, or another danger to health?**

In this chapter, we will explore the first one in some depth. Since public health is so much about going upstream to address the causes of disease, the first controversy about the causes of ill health is perhaps the driving question. However, since so much attention is placed on weight loss, as a personal health, public health, and medical question, it is also important to discuss the second.

To start with, let's briefly consider the frequent proposed solution to obesity -- dieting for weight loss.

News flash: Dieting usually doesn't work

Some people think that "fat people should just lose weight." It's not that simple. What is their access to good nutrition and activity? Does dieting work in the long term? Is it healthy? Is a fat person who loses weight going to have the same health outcomes as a person who has been thin all their life?

There is good evidence that *dieting does not work over the long term for most people*. The vast majority of people who diet regain the weight they lost. For those who maintain weight loss, their metabolism is usually NOT the same as that of a person who was never fat -- meaning that they have to work harder than a thin person would to maintain that lower weight.

New weight loss drugs (see ADD PAGE) do often work for sustained weight loss for those who can afford them, tolerate the side effects, and persist in using them for years. Most people using Ozempic or Wegovy lose about 12-15% of their body weight over a 16-month-period if they combine it with dietary changes -- for someone weighing around 200 pounds, that would mean a 30-pound loss. That may have positive effects on blood pressure, blood sugar, or arthritis symptoms and can result in a meaningful improvement for health. It would not mean that everyone fits into the "normal weight" category of a BMI chart after using weight-loss drugs, nor that they fit some societal standard of thinness determined by fashion. Population health implications of these new drugs are being studied now -- it's unclear how large an effect they may have on rates of diabetes, high blood pressure, or other ailments.

Optional Articles on this Subject

While some of these articles are older, they still offer an important perspective on the links between fat, fitness, and health.

"The Fat Trap," from the *New York Times*
This article discusses how people maintain significant weight loss, often with great difficulty.

"**At a Glance: Nutrition, Physical Activity and Obesity**" This webpage makes the link between chronic disease and nutrition and physical activity. It highlights trends in obesity, and it emphasizes what the CDC is doing about it.

Can you be fat and fit, or thin and unhealthy? This article adds a few more layers to the obesity debate, making a distinction between those who are "metabolically healthy" and "metabolically unhealthy".

CNN: 'Fat but Fit' Is a Myth...
This article highlights a study that shows for people at ALL weights, more physical activity improves cardiovascular health. It also shows that who are obese are more likely to develop heart disease than those who are thinner, when you compare people with the same level of physical activity. This suggests that everyone should stay active/fit AND that obesity is still a

health risk, even among those who are active. The article also includes (near the end) the views of a couple of researchers who critique the study and come back to affirming the evidence for the "fat but fit" idea. As you can see, science evolves over time through both data and debate -- and it can take a lot of studies and a lot of time to reach a new consensus on health.

There is consensus, however, that good nutrition and physical activity are good for everyone's health, regardless of weight.

Both thin and fat people benefit from good nutrition. Both thin and fat people benefit from some level of physical activity. Regardless of whether it leads to any change in weight. Good nutrition and physical activity -- like sleep and stress reduction -- have independent effects on health, apart from any influence they have on body size.

I have noticed that people often start talking about nutrition, then switch to talking about weight as if it were the same thing (or vice versa - they start talking about weight and blend it with nutrition). Of course, there is a relationship among nutrition, physical activity, and weight -- but they actually are not the same thing!

In this Chapter...

In this chapter, I present some of the data and arguments on **both sides of the controversy about obesity's effects** so you can reach your own conclusions.

New research in the coming years should improve our understanding of the health impacts of weight, resolving the controversy or finding common ground. At the moment, though, you should know that it is under debate.

- *First*, I present some information on **rates of obesity and overweight** -- the undisputed fact that Americans are larger now than they were in the past.
- *Then*, I present the **mainstream view of obesity as a serious health crisis**.

- *Then,* I introduce you to some of the arguments of the "obesity skeptics" and the analysis of how **weight stigma** (or bias) has a significant effect on health.
- *Then*, we take a closer look at the many **factors that contribute to obesity** in the population as a whole.
- *Then,* this module offers a brief look at **strategies to promote access to good nutrition and physical activity,** resources that improve health regardless of weight or size.

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8.4: Americans have gained weight

There is no debate that Americans, on average, are bigger than they used to be. Rates of childhood obesity and overweight rose between the mid-1970's and the late 1990's, which raised a sense of urgency about this issue, yet the trend continued. During 1999–2016, obesity prevalence increased from 31% to 40% for adults and from 13.9% to 18.5% for children (CDC). In recent years, the increase in rates of obesity has slowed or leveled off, though the percentages for the category of "severe obesity" has continued to move upward.

- "During August 2021–August 2023, the prevalence of obesity in adults was 40.3%, with no significant differences between men and women. Obesity prevalence was higher in adults ages 40–59 than in ages 20–39 and 60 and older." (CDC)
- "From 2013–2014 through August 2021–August 2023, the age-adjusted prevalence of obesity did not change significantly, while severe obesity prevalence increased from 7.7% to 9.7%." (CDC)

There is significant regional and state variability in the rates of obesity, with higher rates in the Midwest and the South, as shown, for example, on this map from the CDC.

There are important **health inequities** in rates of obesity:

- Women used to be more likely to be obese than men, but gender differences have declined.
- African Americans, Latinos, Native Americans and Pacific Islanders are more likely to be obese (or to have obesity) than are Whites or Asian Americans.
- Those with lower income are generally more likely to be obese than those with higher income, with the exception of African American men and Latino men, where higher income is associated with more risk of obesity.

Optional links: Adult Obesity Facts (CDC) and Childhood Obesity Facts (CDC)

Define Overnight and Obesity

The CDC generally defines overweight and obesity in terms of Body-Mass Index (BMI), a ratio of height to weight.

- According to the CDC, a person is "healthy weight" if their BMI is between 18.5 and 24.9.
- Overweight is defined as a BMI of 25 to 29.9.
- Obese is defined as a BMI of 30 or greater.
- And underweight refers to those adults with a BMI lower than 18.5.

When discussing children, the terms overweight and obese are used a little differently - usually to describe children who are above the 85% percentile for their age, height and sex. (source: http://www.cdc.gov/obesity/defining.html)

After a period when the increase in obesity leveled off and even decreased in some groups -- the youth rates of obesity did not change in the decade between 2003-2004 and 2013-2014 and the rate of obesity among children aged 2 to 5 decreased from 13.9% to 9.4% in that same decade -- rates of obesity have risen again in the last five years.

Obesity rates, especially child obesity rates, have also risen since the beginning of the covid-19 pandemic -- probably due to a number of factors (less time in school, less activity overall, more food insecurity for some, boredom eating, stress, increased experiences of discrimination for some groups, etc.)

Facts are facts

There is no debate or controversy about these basic facts -- all sides of the controversy agree that Americans have on average become fatter.

There is also no controversy about the **CORRELATION** of higher BMI with chronic disease. We see fatness and chronic conditions often occur in the same people.

The controversy lies in **whether the fat itself is the *cause* of chronic disease and early death, or whether *other* explanations are better**. Are there other factors playing the major role in chronic disease rates?

The next two pages -- one written by me and another drawn from Calderone's public health textbook -- give the mainstream view of obesity as a major driver of chronic disease. After that, we'll consider the alternative explanations.

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8.5: ONE VIEW- Obesity - the most serious health problem of our day!

This is *one side* of the obesity debate or controversy -- and it is, by far, the dominant side.



Among the health dangers that the CDC and other health sources emphasize are the increased risk for the following disorders, which have been correlated to overweight and/or obesity:

- Coronary heart disease
- Type 2 diabetes
- Cancers (endometrial, breast, and colon)
- Hypertension (high blood pressure)
- Dyslipidemia (for example, high total cholesterol or high levels of triglycerides)
- Stroke
- Liver and Gallbladder disease
- Sleep apnea and respiratory problems
- Osteoarthritis (a degeneration of cartilage and its underlying bone within a joint)
- Gynecological problems (abnormal menses, infertility)

As you can see, this list includes some of the most significant health problems our society faces today. (CDC)

Most public health researchers would go beyond seeing these diseases as *correlated* to obesity - **they see obesity as *an actual cause* of at least some of these disorders**.

- Notably, in Type 2 diabetes the interaction of insulin and fat cells is important, and therefore having more fat may lead to the development of this disease (even though diabetes also appears in thin people).
- There are numerous articles that show the health benefits of weight loss, often seen with even very small amounts of weight (5-10 pounds).
- There are other studies that focus on the health benefits of simply staying at the same weight - not gaining more. Here is one that highlights that latter approach (optional).

New weight loss drugs

Just recently, **new weight loss drugs have been discovered**-- semaglutide (sold as Ozempic and Wegovy) and other even-newer drugs. These drugs, originally developed for treating diabetes, have been shown to produce more weight loss than previous drugs -- around 15% of a person's body weight. More importantly, they also improve other metabolic markers (like, reducing

inflammation and improving how the body handles blood sugar). While they cause some digestive side effects, most people seem to be able to tolerate those. Doctors and some public health workers are excited about these drugs and the impact they could have on obesity-linked disease. This is the first time we've had such a drug available that is shown to work this well.

A couple of caveats:

- For people who are seriously obese (what doctors call "morbidly obese"), even if they lose 15% of their body weight, they will still be obese. These drugs will not eliminate obesity. So, news stories talking about "the end of obesity" are problematic.
- Still, if these drugs eliminate some of the diseases and inflammation associated with obesity, it's still a big medical advance. I'm excited that this will be an option for people who want to pursue it.
- The drugs work only while people are taking them. When people go off the drugs, they regain the weight. So we should expect that, in many cases, people will use these drugs long-term.
- The drugs are very expensive, costing $900-1,500 per month. For some people, this will be covered by insurance.
- Because people who are not obese and who have money have been buying up the drug for aesthetic reasons, it has created shortages of these drugs for diabetics who actually NEED them. I hope this will be resolved with increased production -- but at the moment, the shortages are actually life-threatening for some diabetics. People who don't need these drugs should not be taking them while they are in short supply.

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8.6: Obesity - measurements and impacts

This page, from Calderone's *Public Health 101*, adds in some economic information to the examination of the impact of obesity.

The obesity epidemic is the probably most modern public health concern. Body fat is not an inert blob. In fact, adipose tissue (fat storage cells), are metabolically active, pumping out hormones and cytokines (chemical messengers) associated with everything from satiety (that feeling of fullness) to inflammation (Foreman, 2020). Excess stored fat on the body is associated with the leading causes of death, including CVD, stroke, diabetes, several cancers, pancreatic, gallbladder, and kidney diseases, and breathing problems like sleep apnea and asthma. Carrying excess weight throughout life can impede physical activity, and when people do move it causes more stress to joints - which are then more likely to develop osteoarthritis (inflammation and breakdown of cartilage). Although infectious diseases are caused by pathogens, people with excess body fat can often experience more severe illness from infections. Social stigma around obesity can impede career, academic, and social function, and these factors combined with obesity can lead to poor mental health (NIDDK, 2023). Of particular concern is visceral, or central adiposity, which is the fat that accumulates around the internal organs in the abdomen and is more strongly associated with chronic health risks due to its metabolic activity. Central adiposity is a more common weight distribution pattern in men and postmenopausal women, putting them at higher risks for cardio-metabolic diseases like diabetes, hypertension, and cardiovascular disease (Juppi et al., 2022).

It would be optimal to estimate body fat accurately with tools like a dual energy X-ray absorptiometry scan (DEXA scan) or even bioelectrical impedance analyzer (BIA), but these are often costly machines. The DEXA requires trained personnel to operate, and results from the BIA can be influenced by other physiological factors (like hydration status), so specific procedures must be followed to ensure accuracy. Therefore, these tools are not typically used to estimate fat mass to body weight ratios, or body fat percentage (BF%), for large populations. Instead, epidemiologists have long used a controversial calculation of weight-to-height ratio instead, called body mass index (BMI). There are several reasons that BMI is considered less accurate than BF%, one of them being that BMI will be higher in those individuals with more muscle mass or bone density, and there may be genetic variance in body density that is not accounted for by BMI. For example, Asian populations tend to have lower rates of obesity as classified by currently accepted cutoffs (see below), and yet have higher rates of central adiposity (fat around the internal organs in the abdomen) and higher levels of obesity-related disease factors at lower BMIs (Li et al., 2023). Even with these complications, BMI is easy to calculate using self-reported weight and height, and so large epidemiological surveys still employ this measurement to indicate health-related weight status for populations.

BMI is calculated using either of the equations below:

BMI = weight (kg) / height $(m)^2$ BMI = weight (lbs) / $[height (in)]^2$ x 703

Using BMI levels as criterion values for weight status provides the following classifications:

- Underweight = BMI <18.5
- Normal weight = BMI 18.5-24.9
- Overweight = BMI 25-29.9
- Obesity = BMI 30+
- Severe or “morbid” obesity = BMI 40+

Although we have been calling obesity an epidemic for what seems like a long time, it is still a growing problem. According to the CDC, the prevalence of adult obesity was 30.5% in 1999-2000, and had increased to 41.9% in 2017 - March of 2020 (at the beginning of the COVID-19 pandemic response). Severe obesity increased from 4.7% to 9.2% in the same timeframe. In terms of healthcare, obesity costs over $1,861 excess 2019 dollars per person, and severe obesity over $3000 per year. Obesity also disproportionately impacts people of color, with the highest rates of obesity in Non-Hispanic Black populations (49.9%), and Hispanic (45.6%) populations. Interestingly, those populations who had a high school diploma and some college had the highest rates of obesity (46.4%) compared to those without a high school diploma (40.1%) and those with a college degree or higher (34.2%). As we might expect, obesity rates do increase with age up to the 40-59 year old range, then decline slightly for those over 60 years of age (CDC, 2024c). Some researchers project that the rates of obesity in U.S. adults will reach almost 50% by 2030, and half of that will be severe obesity (Ward et al., 2019).

Obesity is not only a problem in America either. According to the WHO, obesity rates have doubled worldwide since 1990: with nearly 1 in 8 adults, and 8% of children between the ages of 5-19 living with obesity in 2022. In medium and low income countries

in particular, obesity co-exists with malnutrition. Food insecurity may include not having enough food to eat or only having access to low quality food sources, often high in sugar and fat, which are associated with the development of obesity. Thus, undernutrition and obesity may both be affecting impoverished areas around the globe (World Health Organization: WHO, 2024a).

In a higher-income country like the U.S., obesity has increased in both low and high socio-economic strata. However, poverty is still considered a driver of obesity, as well as other factors associated with poverty such as stress and “obesogenic” environments. The link between obesity and socio-economic status may be bi-directional. Having obesity may limit economic success via weight stigma in the workplace, while conversely, living in a wealthier neighborhood with plenty of greenspace and opportunities for physical activity, as well as access to high-quality healthy food sources (more supermarkets, fewer convenience stores), is associated with having a lower BMI (Anekwe et al., 2020).

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8.7: A DIFFERENT VIEW- Obesity - a manifestation of fat-phobia and a distraction from the real issues!

The *other side* of this debate maintains that the dangers of increased size (or increased fatness) have been greatly exaggerated.



Scientists and activists on this side of the debate make several arguments: that estimates of the negative health impacts of increased size are flawed, and health benefits to larger size are ignored. They point to evidence that it is possible to be fat and fit (or thin and unfit). They suggest that a widespread cultural prejudice against fat people has influenced the research and the reporting on this issue. Some of them say that the influence of the diet industry on research has introduced bias (although personally, I'm not convinced by that argument -- I think the sugar and dairy industries have at least as much influence on research as the diet industry does).

Among the arguments that obesity skeptics make are:

- In the same period that average weight in the US has increased, deaths from heart disease and stroke have decreased and life expectancy has grown.
- In a major study by the CDC on life expectancy, people in the "overweight" category had a LONGER life expectancy than people in the "normal" weight category. People in the "underweight" category were at as much risk for early death as people in the "morbidly obese" category.
- While people who are overweight are at greater risk for diabetes and high blood pressure, they are at lower risk for osteoporosis and some other conditions. (Oesteoporosis is a far less deadly disease, it should be noted.) In addition, obese people diagnosed with Type 2 diabetes tend to live longer than "normal weight" or "underweight" people with the same disease (the "obesity paradox").
- The true risk factors for diabetes and high blood pressure - sedentary lifestyle, poor nutrition, stress, lack of sleep - are associated with obesity too. But it's not the fat that causes the problem, it's the *behaviors* associated with fat. A fat person who gets regular exercise, good nutrition and manages stress has a similar health profile to a thin person who does these things.
- By stigmatizing fat, we make fat people's health worse. Some studies show that it makes people sick. Depression occurs at higher rates in fat children- is that caused by the fat, or by the way society treats fat people?
- Anti-fat bias is rampant in the medical establishment. Many people postpone a visit to the doctor, for example, because they don't want to get on the scale or get criticized by their doctor. Some studies have shown that many doctors say that they dislike treating fat patients - and this could affect the quality of patient care.
- Weight loss and weight cycling (going up and down in weight) have health risks of their own. Most fat people have experienced weight cycling, which puts a strain on the cardiovascular system.
- Most people who lose weight regain it within 2 years. Food and exercise are not the only things that affect weight - our metabolism (how we burn energy) plays a major role, and the body naturally shifts metabolism to use less energy when less

food is available, for example, when dieting.This makes it very difficult to maintain weight loss over the long run.
- Interventions for obese (fat) people that do not focus on weight loss, but instead focus on improving overall health, have better and more long-lasting results than interventions that focus on weight loss. A focus on weight is not necessary for an improvement in health. In addition, a large study recently showed that increasing physical activity improves the health of fat people more than weight loss does.
- Many obesity skeptics agree that extreme obesity (say, a BMI over 45) can carry significant health risks. They do not deny ALL risks of obesity. Yet the vast majority of obese people are in the BMI 30-40 range, and the health risks of that level of obesity are questioned.

Lindo Bacon, a respected nutritionist and scientist who taught many years at CCSF has been a leader in making the scientific case for another approach to size. Lindo calls their approach (and book) Health At Every Size. Their article "Weight Science" was influential in **unlinking weight and health** -- while the connections between health and physical activity, good nutrition, sleep, and stress are all supported by their research. . (Optional -- if you want to read it -- **Weight Science: Evaluating the Evidence for a Paradigm Shift (click here)** (or you can access the article as a PDF too)

I have summarized "Weight Science" in a slide show, below - OPTIONAL. If you click on "WeightScienceSlides.PDF" you can view the slides in the Lesson, or download them to view on your own.

Download Weight Science.pdf

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8.8: What causes obesity? What causes the diseases associated with obesity?

Our genes determine much about how we store fat, how we burn it, what our food cravings are, etc. On an individual level, genetics is probably the most important factor in determining body size and composition.

However, since the genetic pool of an entire population does not change quickly, genes cannot explain the *population* change in average weight over the last 30 years.

Much of the research on obesity focuses on the "big two" factors that are modifiable: changes in diet and physical activity. These have changed significantly over time in the U.S. - for example, many fewer children bike or walk to school than in the past. A movie like *Super-Size Me* highlights how portion-size, especially in the fast food industry, have increased. On average, people eat the same AMOUNT of food as in the past, yet that food contains many more calories, salt and fat than in the past. The book *Salt, Sugar, Fat* does a great job of showing how the food industry engineered food to be more delicious, less healthy, and possibly addictive.

Yet, several other important factors that contribute to obesity that get less attention:

- **Sleep debt** - not getting enough sleep changes both metabolism and hunger signals. Check out this article about sleep and obesity: 'Abnormal' sleep linked to obesity risk - http://www.bbc.co.uk/news/uk-scotland-glasgow-west-39127601

- **Changes in breastfeeding** - babies who are breastfed are much less likely to grow up to be obese - yet due to mothers working and other social factors, fewer children are breastfed. This is a major focus of the CDC's work against obesity -- promoting breastfeeding.
- **The average maternal age is increasing** - that is, the age at which a woman has a child - and having an older mother increases the chance that a child will be obese. (Obviously, there is nothing the child can do about this particular risk factor.)
- **Epigenetics** - in particular, how the environment *in utero* affects what genes do. Epigenetics is a growing field of study. Interventions during pregnancy have shown some promise for decreasing rates of diabetes, as the birthing parent's diet, stress and medications during the nine months of pregnancy can influence not the actual GENES of the baby, but how the genes get turned on and off.
- **Heating and cooling** - the body spends less energy to obtain the optimal temperature when the furnace or the air conditioner do it for us. This might sound minor, but actually, we burn an enormous number of calories simply to maintain body temperature.
- **Certain pharmaceuticals** may contribute to weight gain as a side effect - and Americans use many more prescription drugs now than they did 30 years ago.
- **Cyclical dieting** can also contribute to higher average weight - as anyone who has "gained it back and more" can testify. (Me included!)
- **Discrimination**. As mentioned before, the discrimination that obese people face in hiring, dating, shopping, casual comments on the street, etc. also contributes to stress, strain on the heart, insulin function, and even the metabolic tendency to store fat. (That is, teasing someone for being fat could actually *make* them fatter!) Criticism of one's weight tends to lead to *less* motivation to do physical activity, not more.

These underlying factors have an **independent effect** on the body's inflammation response and the rate of chronic diseases. Therefore, the focus on creating healthier environments does not *only* benefit the obese (or potentially obese) - such changes could improve population health overall.

> It should be noted that many of these risk factors appear in people who are not fat -- and can have serious health effects, regardless of weight.

Due to underlying genetics or behaviors that off-set the "obesogenic" environment, *not everyone* who is exposed to a negative environment will become *obese* - yet the environment may still make them *sick*.

Egger & Dixon make this point with the following diagram (Figure 2 in their article, cited below):

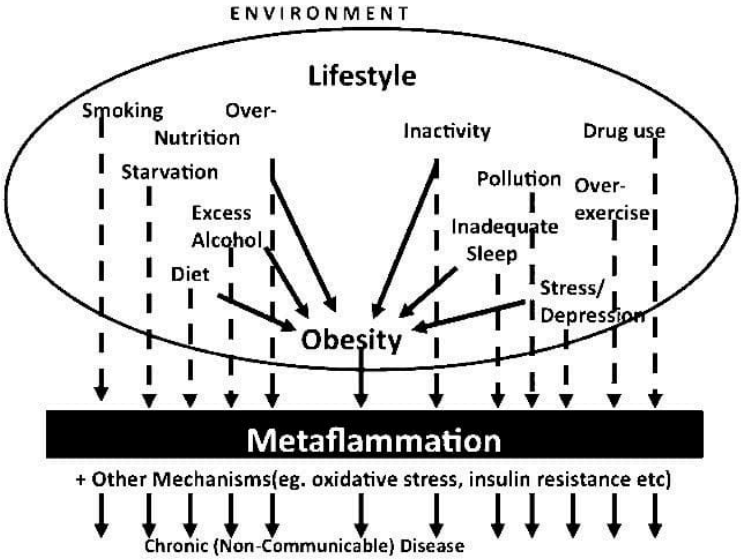


Figure 2: Environmental and lifestyle 'inducers' of metaflammation, showing both independent and dependant effects through obesity

Source: Egger, G. G., & Dixon, J. J. (2009). Should obesity be the main game? Or do we need an environmental makeover to combat the inflammatory and chronic disease epidemics?. *Obesity Reviews*, *10*(2), 237-249. doi:10.1111/j.1467-789X.2008.00542.x

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8.9: WHAT IS GOOD NUTRITION?

There is much research about nutrition. In fact, it seems that there is a news story on nutrition almost every day! Oat Bran! Anti-oxidants! More soy! Less soy! What can you believe?

Even with all this fuss, the basic advice for good nutrition is fairly consistent. Eat a varied diet, plenty of fruits and vegetables, avoid "empty calories", use healthier oils, and add more whole foods (like whole grains).

Michael Pollan boils his advice down to seven words: **Eat food. Mostly greens. Not too much.** I like that advice.

Eat your veggies!

Probably the most-mentioned and least-followed advice is to eat at least 5 servings of fruit and vegetables every day.

The U.S. Food and Drug Administration offers a new tool called **MyPlate** describing the balance among different food groups they recommend. **Probably the most-mentioned and least-followed advice they offer is to eat at least 5 servings of fruit and vegetables every day.** They also recommend eating lean proteins, more whole grains, and plenty of water. Their recommendations for consumption of dairy products and sugars (that is, to eat them in moderation) were controversial - some critics think the dairy and sugar industries influenced these recommendations. The value of dairy in our diet continues to be controversial, and many people cannot digest it - yet for others, it is a valuable source of calcium.

In the Bay Area, iI notice that people can discuss for hours on end the value of a particular diet, a particular supplement, or a particular food. I enjoy this kind of conversation myself, especially over a good meal! I am not a nutritionist, however, and I avoid giving specific nutritional advice. What I can say is that, in general, good nutrition emphasizes fruits and vegetables, protein, unsaturated fats, whole grains, and a variety of choices to ensure that different people's tastes, customs and appetites can be accommodated.

The 6 key nutrients that need to be balanced include:

- **Fats** (unsaturated are healthier for you than saturated; transfats are especially unhealthy and should be avoided or banned)
- **Proteins**
- **Carbohydrates** (especially complex carbohydrates, like those found in vegetables and whole grains)
- **Fiber**
- **Vitamins and minerals**
- **Water**

Public Health Interventions to Improve Access to Good Nutrition

From a public health point of view, the key question is whether MOST PEOPLE have access to good nutrition. In public health, we focus less on the individual, and more on the population.

When food is provided for free or low-cost (in school lunches, for example, or through WIC coupons), is that food nutritious? varied? fresh? affordable? Is good food available for purchase at a reasonable price in people's neighborhoods? What types of food and agriculture does the government subsidize most?

Many nonprofits, community activitsts and public health departments have been working to **increase access to good healthy food.** There are factors that influence food choice besides access -- what people prefer, if food is their only affordable "treat," whether people have time and a place to cook, price -- but **access** is a basic first step. You can't eat good nutritious food if you don't have access to it. This short video from UCTV (2010) describes actions by the San Francisco Dept. of Public Health, talking about local efforts to improve access to good nutrtion. (Susanna Hennessey-Lavery who is one of the presenters in this video used to teach at CCSF.) *Optional video.*



8.9.1: Nutrition
8.9.2: Nutrition Environment and Services

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8.9.1: Nutrition

Here is another quick overview of good nutrition, from Calderone.

If obesity rates are high in the U.S., we might safely assume that nutritional status is poor on average as well. Since 1980, the USDA has published nutritional guidance in the *Dietary Guidelines for Americans* with updates every 5 years to align recommendations with current nutrition science (USDA and HHS, 2020). The purpose of these guidelines is to promote health and prevent disease in the U.S. population, not to prescribe specific diets for each individual. In the 1990s, the USDA adopted the "Food Pyramid" to provide a visualization of daily servings for different food groups. In 2011 this was revised to *Choose My Plate* which created a much easier visual representation of the guidelines in the form of a plate (Raikar, 2023). The most recent guidelines also place emphasis on ethnic and cultural variations in dietary patterns and how the guidelines can be applied in enjoyable and affordable ways (USDA and HHS, 2020). Below are the overarching guidelines in the most recent iteration (2020-2025):

1. Follow a healthy dietary pattern at every life stage.
2. Customize and enjoy nutrient-dense food and beverage choices to reflect personal preferences, cultural traditions, and budgetary considerations.
3. Focus on meeting food group needs with nutrient-dense foods and beverages, and stay within calorie limits. Food groups include:
   a. Vegetables of all types - dark green; red and orange; beans, peas, and lentils; starchy; and other vegetables
   b. Fruits - especially whole fruits
   c. Dairy, including fat-free or low-fat milk, yogurt, and cheese, and/or lactose-free versions and fortified soy beverages and yogurt as alternatives
   d. Protein foods, including lean meats, poultry, and eggs; seafood; beans, peas, and lentils; and nuts, seeds, and soy products
   e. Oils, including vegetable oils and oils in food, such as seafood and nuts.
4. Limit foods and beverages higher in added sugars, saturated fat, and sodium, and limit alcoholic beverages (USDA and HHS, 2020).

The ChooseMyPlate model visually represents relative portion sizes for each major food group. See Figure 10.4 below.



Figure 8.9.1.1: Start Simple with MyPlate. USDA, 2020. Adapted from: https://myplate-prod.azureedge.us/sites/default/files/2021-01/DGA_2020-2025_StartSimple_withMyPlate_English_color.pdf

Researchers and epidemiologists utilize a scoring system to compare current eating habits of Americans with the dietary guidelines. This score is called the Health Eating Index (HEI) and is reflective of diet quality not quantity (or number of calories consumed). Between 2005-2006 and 2015-2016, HEI scores taken from NHANES data have averaged around 56-60/100. This

reflects a persistence in typical eating patterns remaining far below the dietary guidelines in terms of quality (USDA and HHS, 2020). In terms of quantity, we are certainly eating more. United Nations publications indicate that total calorie consumption is up worldwide in the past two decades, increasing by 9% between 2021 and 2022 to an average of 2960 kcals per day. In Europe and North America, the average was 3,540 kcal per day (United Nations News, 2022). Data from the USDA suggest that average daily consumption per capita in the 1970's was just over 2,000 kcal. Although dietary fads come and go, Americans are certainly consuming more grains, fats than we used to (DeSilver, 2016), and the consumption of sugar-sweetened beverages is up in the U.S. and worldwide (Lara-Castor et al., 2023).



Figure 8.9.1.2: (Photo by David from Freerange Stock)

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8.9.2: Nutrition Environment and Services

Our food environments affect our diets. This starts in early childhood -- so examining policies and approaches to school nutrition are key.

Similar to physical activity, healthy eating patterns are also learned behaviors which have a huge impact on health both during childhood and adolescence and in the future. Although nutritional needs vary between individuals and across the lifespan, the Dietary Guidelines for Americans 2020-2025 recommends that children and adolescents eat a variety of fruits, vegetables, whole grains, and proteins, and drink water or 100% fruit juice while limiting sugar-sweetened beverages. According to the Health Eating Index (HEI-2015) nutritional patterns for American children are poor to begin with, and then tend to decline further over adolescence. Of particular concern is the lack of fruits, vegetables, dairy products, and whole grains in the typical-kid diet (although consumption of refined grains is high), as well as low protein intake for teenage girls. Overall, the greatest dietary concerns for children and youth come from a high consumption of sugar-sweetened beverages, and the lack of nutrient-dense plants and protein sources. Particularly during adolescence - a time of rapid growth and physical maturation - this dietary pattern can lead to malnutrition and nutrient deficiencies (USDA and HHS, 2020).

It's hard for kids to learn in class when they are hungry. One of the strongest associations between nutritional behaviors and getting higher grades is eating breakfast (CDC, 2021). Yet according to the most recent YRBS reports (2021), 22% of high school students reported not eating breakfast, and only 25% ate breakfast all 7 days of the previous week (*Youth Risk Behavior Surveillance System (YRBSS)*, 2023). In the 2022-2023 school year, over 14 million children received a free or reduced price breakfast, and twice as many (over 28 million) participated in free or reduced price lunch programs. Compared to the school year prior, this was a decrease of 1.2 million breakfasts and 1.8 million lunches. Due to pandemic-era funding in 2021-2022, federal waivers had supported free breakfast and lunch programs for any student without any means testing (for example, ensuring that their families met low income requirements). Schools had also found creative ways to ensure students got breakfast: by allowing them to eat in the classroom, or serving a late breakfast after the first class of the day. The elimination of federal waivers and "going back to normal" school policies in the 2022-2023 school year have been indicated as causes of reducing the number of students being served school meals. Eight states - including California - instead implemented Healthy Meals for All legislation to keep access to breakfast and lunch free for all students (Hayes & FitzSimons, 2024). These meals tend to be healthier than what students might otherwise eat, since school breakfast and lunch programs have to follow specific standards for nutrition, including providing fruits, vegetables, and whole grains.Students who participate in the school breakfast program tend to miss fewer days of school and do better on tests (CDC, 2022d).

Taking a WSCC approach includes more than just the food in the cafeteria. Children and adolescents can learn about healthy nutrition from health education classes, messaging (posters, labels, marketing etc.) in the school cafeteria, and modeling by staff. All of the competing food on the school campus (vending machines, etc.) should follow similar health standards to the breakfast and lunch programs. Schools can promote drinking water instead of sugar-sweetened beverages by ensuring that drinking fountains are accessible and operational, and allowing water bottles in the classroom (see also Fig 9.3). Direct education on healthy eating patterns alone is probably unlikely to affect behavior change alone, especially since most schoolchildren get 8 hours or less each year. Instead, the WSCC approach encompasses everything from making nutritious food available, providing adequate time to sit down and eat, normalizing healthy eating patterns, and reinforcing positive messaging throughout the school day, as well as implementing special programs like Farm to School programs or school gardens (CDC, 2023a). See Fig. 9.3 below for the CDC's diagram of the Components of the School Nutrition Environment and Services.



Figure 8.9.2.1: Components of the School Nutrition Environment and Services. CDC. (2023). (*School nutrition environment*. CDC. https://www.cdc.gov/healthyschools/nutrition/schoolnutrition.htm)

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8.10: PHYSICAL ACTIVITY

Physical activity is any movement that enhances your overall fitness and well-being. It does not have to be deliberate exercise. It can include walking to the store, or vacuuming, or gardening, or going dancing with friends.



An increase in sedentary jobs and sedentary leisure activities (for example, going on the computer instead of walking to a friend's house) has meant that many people in the United States and other wealthier countries do not move much. We use cars more, walk less. We watch movies more, play ball less. Our jobs often have us sitting or standing in one set place much of the day.

This trend affects children as well as adults. Often, children live farther from their schools than in the past, or their neighborhoods make it unsafe to walk or bike to school (due to traffic patterns or violence).

Examples:

- In 1972, 42% of kids walked or biked to school (regardless of school distance).By 2013, that number declined to 13%. (SRTS)
- To compare *only* the kids who lived within 1 mile of school, in 1969, 89% of those kids walked or biked to school. In 2009, the number dropped to 35%.(SRTS). The CDC in 2016 estimated that less than 20% of kids walk or bike to school (CDC).

This brief (2 minute) *optional* video illustrates the findings of one research study on how children's activity levels drop as they age. This is one example of how public health research can be helpful in zeroing in on a specific aspect of a large problem:

Benefits of Physical Activity

Some benefits of physical activity include

- reducing stress
- improving digestion
- increasing blood flowl
- lowering blood pressure
- improved flexibility

Increasing one's physical activity is beneficial in controlling diabetes, maintaining heart health, relieving depression, preventing osteoporosis, improving brain function, and more.

For some disorders, it is even more beneficial than medication. This article summarizes two scientific reviews (optional) and found the benefits of exercise to be basically comparable (and in some cases better) than the results of medication, for reducing high blood pressure and also visceral body fat (the fat in the torso around vital organs).

- What are your ideas about how to increase physical activity -- for yourself or for your community?

- Do you feel you are active enough, or would you like to be more active?
- Are there ways you can think of to squeeze in 10 minutes of activity, a few times a day? There is great benefit to even small increases in activity levels.

Optional resources on this topic

Physical Activity for Everyone

Physical Activity Options for those with mobility restrictions or physical disabilities

All Communities Deserve Safe Places to Play and Be Active

The Community Guide from the CDC

CDC guidelines (9 guidelines in all) for schools, to promote healthy eating and physical activity.

Shape Up San Francisco

Prevention Institute, in particular their work on healthy food and activity environments

The CDC recommends at least 1 hour a day of physical activity for children, and about 30 minutes per day for adults, with a mix of aerobic exercise (the kind that gets your heart pumping) and strengthening exercise. To make that happen, though, we need more than recommendations -- we need programs and policies that make it easier.

From a public health perspective, the social and physical environment has everything to do with how likely people are to get enough physical activity!

It is more than just will-power. We need safe places to walk (probably the world's most popular exercise) and play. It helps if physical activity is convenient and easily accessible. We need time to do it too - with both the average work week and the average commute much greater than they were a generation ago, it gets difficult to add in activity.

There's a reason people call exercise "the true fountain of youth."

8.10.1: Physical Activity and Fitness

8.10.2: Physical Education and Physical Activity

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8.10.1: Physical Activity and Fitness

Both maintaining consistent physical activity and having a high level of physical fitness are protective against the chronic diseases which are the primary causes of death. Physical activity refers to the total amount of movement you get throughout the day. Fitness is referring to the conditioning of your body: the capacity of your heart, lungs, and muscles to perform high intensity work. The two are indelibly intertwined of course, since it takes a minimum level of fitness to be physically active, and those who have a high level of fitness tend to do more physical activity. Yet what is interesting is that each is independently protective against cardiovascular disease, diabetes, and some cancers - regardless of body weight, or age, or sex (which are usually also risk factors). In other words, being active and fit is important for health in every body (Foreman, 2020).

The CDC recommends that adults get a minimum of 150 minutes of moderate physical activity or 75 minutes of vigorous physical activity (or some combination of both) per week, including muscle strengthening exercises on at least 2 days of the week. But that's just the bare minimum. Doubling that amount - 300 minutes of moderate or 150 minutes of vigorous physical activity - can provide substantially greater health benefits. In this way, physical activity and exercise have a dose-response relationship with better health: some is good, and more is better. Children and adolescents are encouraged to do at least 60 minutes per day of moderate to vigorous physical activity, some of which should include muscle and bone strengthening exercises on at least 3 days per week (U.S. Department of Health and Human Services, 2018). There isn't anything magical that happens between the ages of 17 and 18 that immediately decreases the need for physical activity - shifting from the recommendations for children and teens to those of adults. However, it should be noted that as kids grow they may shift from unstructured play to organized sports and/or exercise. Perhaps the changes in recommendations are more a reflection of societal demands (education, work, etc.) that change *how* we engage with physical activity (van Sluijs et al., 2021). Of course, there is also an upper limit where frequent, high intensity exercise provides no further benefits for health and longevity - or could even be dangerous. But this excessive amount is typically only the stuff of avid endurance athletes, or a concern when a sedentary person drastically increases their PE all of a sudden (Foreman, 2020).

Most Americans certainly do not get enough physical activity. In 2018, only 54% of adults reported achieving the CDC recommended minimum for minutes of physical activity per week, only 27.6% performed at least 2 days per week of muscle strengthening exercises, and only 24% got both (DNPAO, NCCDPHP, CDC, 2024). According to data from the Behavioral Risk Factor Surveillance System (BRFSS) over the years 2017-2020, over 25% of adults reported getting NO physical activity outside of their work (CDC, 2024d). Adolescence is a time where physical activity tends to decline - we go from energetic, playful children to much more sedentary teens and young adults. This decline in physical activity is sharper for teen girls than boys, likely due in part to the drop off of PE requirements during the last two years of high school combined with gender-skewed participation in organized sports. Nearly 80% of adolescents across the globe do not get enough physical activity, and in high income countries like the U.S., these trends also disproportionately affect teens in lower socioeconomic tiers (van Sluijs et al., 2021).

"Fitness" is traditionally classified as cardiorespiratory fitness (CRF), as measured by a maximal, submaximal, or field test. These tests either directly or indirectly measure the maximum capacity of the human body to use oxygen for physical work, so they essentially measure aerobic (endurance) capacity. Of course there are other measures of fitness including muscular strength, endurance, flexibility, and balance - all of which also have been shown to have protective health benefits. The majority of the research over the last several decades however has been done on CRF and its inverse association with chronic diseases, and particularly risk factors for cardiovascular disease. Poor CRF is considered a stronger risk factor for all-cause mortality than obesity, hypertension, smoking, high cholesterol, or diabetes (Foreman, 2020). And improving CRF and physical activity levels decreases risks for all-cause mortality *regardless of weight status.* So for folks who have excess body fat, if they also have a moderate to high level of fitness, they are in better health than those with normal weight and low fitness levels (Gaesser & Angadi, 2021).

Getting an accurate picture of the average CRF in Americans is tricky though. While some studies have been able to collect accurate measurements on large groups of people, the less fit are often left out of these measurements because performing a validated CRF treadmill test on them is too risky. Thus, several studies that attempt to take cross-sectional measurements of CRF tend to recruit people who are already physically active or fit, and their subjects tend to be predominantly white, with relatively high incomes and educational attainment. Even with these limitations to the research, it is still apparent that on average, CRF declines with age, and higher CRF is associated with more leisure-time physical activity and lower body mass. CRF also tends to be disproportionately lower in women of color than other demographic groups (Wang et al., 2010).

Physical activity has other benefits besides chronic disease prevention, including supporting mental health. Being active can reduce both acute (immediate) and long-term symptoms of depression and anxiety. Adolescents who are active on at least 5

days per week and those who play sports tend to have a lower risk for depressive symptoms. By contrast, using a computer - a very sedentary behavior - for more than 3 hours per night increases risks for depression (C. H. Wang & Peiper, 2022). Physical activity can support quality, efficient sleep, which also supports mental and emotional health. When it comes to brain gains, most of the evidence for the acute and long-term cognitive benefits of physical activity has been found in children, yet there is growing evidence for the association of CRF with academic achievement in young adulthood (Åberg et al., 2009). Lifelong physical activity is certainly protective against dementia and improving cognition in older adulthood (U.S. Department of Health and Human Services, 2018). In fact, physical activity and exercise combat most of the markers of aging - including muscle loss (sarcopenia), bone loss (osteoporosis), and reductions in physical functioning. There's likely no other behavior quite as powerful for longevity and quality of life as being physically active (Foreman, 2020).

The other side of the physical activity coin is time spent not moving - or sedentary time. Research from 2019 suggests that American adults may spend an average of 9.5 hours per day sedentary (Matthews et al., 2021). A follow up in 2022 suggested that the COVID-19 pandemic didn't really change time spent sedentary for most people. Although some folks started working from home and saving time on their commute, that only seemed to translate to more leisure physical activity time for men, not so much for women. Much of that saved commute time was simply spent in sedentary leisure activities. Families with children who had to complete remote schooling tended to decrease their physical activity throughout that time (Matthews et al., 2022). Recent research suggests that long bouts of sedentary time and/or the accumulation of prolonged sedentary hours is leading to chronic diseases and conditions, including CVD, diabetes, some cancers, muscle weakness, low back pain, depression, and more (Foreman, 2020). Even those adults who reach the recommended minimum physical activity may not be able to undo all of the health hazards of sitting for the rest of the day. Per a meta-analysis of sedentary studies and risk of all-cause mortality, it takes about 60-75 minutes of hard exercise to offset the risks of sitting for more than 8 hours each day (Ekelund et al., 2016). In other words, not only do people need to move more for their health, they also need to sit less.

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8.10.2: Physical Education and Physical Activity

Just as food environments are key to nutrition, the policies and physical structures of our environment influence choices around physical activity. Is a neighborhood walkable? Is it safe and well-lit? How about policies in the workplace or school that support physical activity and play? Schools are especially important in setting lifelong patterns of activity, and for that reason physical education (gym class) is discussed here.

According to evidence-based guidelines from the U.S. Department of Health and Human Services (HHS) and the CDC, children between the ages of 6-17 should be getting at least 60 minutes of moderate to vigorous physical activity each day. This can include age-appropriate activities such as sports, dance, exercise, and unstructured play. Any type of physical activity that is aerobic in nature, or promotes muscle or bone strengthening can be beneficial for both physical health and for cognitive skills like memory and focus (HHS, 2018). Childhood is also the best time to learn and develop motor skills such as running, skipping, jumping, throwing, catching, and balancing - foundational skills that increase the likelihood of participation in organized sports, dance, and exercise later in life. Although young children do tend to participate in physically active unstructured play "naturally", the development of motor skills also requires instruction and practice, emphasizing the additional need for structured physical education during childhood. In fact, the combination of both structured physical education and opportunities for unstructured play allows for children to practice skills and improve their health and fitness (Moon et al., 2024). See Fig. 8.10.2.1 for more benefits of physical activity during childhood.



Figure 8.10.2.1: Benefits of School-Based Physical Activity. (Copyright; CC0 CDC.gov https://www.cdc.gov/healthyschools/physicalactivity/school_pa_benefits.htme)

Physical activity also does not take away from academic time - in fact, it can play a supportive role. There is ample evidence at this point in time that physical activity can acutely improve the learning experience. Integrating physical activity into classroom lessons or creating activity breaks throughout the school day has been shown to improve students' focus and educational outcomes (Lansky, 2022). Although there isn't enough data to suggest that physical activity levels directly improve grades in high school, there is definitely a correlation between physical activity, less sedentary time, and higher grades earned (*Youth Risk Behavior Surveillance System (YRBSS)*, 2023). The research on whether physical activity interventions improve academic performance is mixed, but mostly indicates a positive or neutral effect (Rasberry et al., 2011).

Current data suggest that less than a quarter (24%) of U.S. children and youth achieve the recommended minimum amount of daily physical activity. Just over 50% of U.S. high school students get daily physical activity and about the same percentage report attending physical education classes in an average week (CDC, 2022a). Total physical activity tends to decrease as children get older, with the sharpest declines happening in middle school. Girls tend to be less active than boys and experience a sharper decline as they enter higher grades (Pate et al., 2022). Perhaps this is due to increasing academic demands, whether or not students participate in organized sports, or even social and cultural pressures that cause a decrease in unstructured play. In the most recent Youth Risk Behavior Survey (YRBS) data from 2021, the percentage of high school students playing on at least one

sports team dropped below 50% for the first time since 1999 - likely influenced by precautionary measures taken during the COVID-19 pandemic (*Youth Risk Behavior Surveillance System (YRBSS)*, 2023).

Schools can provide opportunities for students to learn and practice physical skills, and engage in physical activity during the school day, and also before and after school hours. A comprehensive school physical activity program (CSAP) includes the community, staff, and families in promoting physical activity throughout the day. Installing safe playground equipment and maintaining school grounds and gymnasiums can encourage physical activity during recess. Physical education curriculum should teach students skills for lifelong physical activity, as well as supporting age-appropriate motor development, emotional intelligence, ethical behaviors in competition (aka “sportsmanship”), and self-efficacy. This requires a trained, certified physical education teacher. Partnerships with community resources (afterschool programs, sports clubs etc.) and keeping school yards and playgrounds open for the community can provide opportunities for physical activity outside of school hours. Safe sidewalks, paths, and street crossings can support active transport to and from school. Finally, emphasizing the importance of physical activity for children can also spill over into the rest of the community - whether via employee wellness programs or family activity events (CDC Healthy Schools, 2021, Seabert et al. 2021).

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8.11: Additional Resources

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8.12: Additional References - partial list

On some pages in this chapter, references are listed at the bottom of the page or are linked directly in-text. On other pages, there may be references cited in-text only -- many of those references can be found on this list below, drawn from Calderone.

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9: COMMUNITY HEALTH IN DIVERSE RACIAL AND ETHNIC POPULATIONS COMMUNITIES IN THE US

The United States is an increasingly diverse country, with states like California at the forefront of culturally-responsive approaches to community health. Seven states (as of 2020 Census data) are already majority-minority states (states where non-Hispanic whites make up less than 50% of the population): Hawaii (the only state that has never had a white majority), New Mexico, California, Texas, Nevada, Maryland, and Georgia. In at least 14 states, the child population is majority non-white. The complex needs of diverse communities have important implications for US public policy and public health, leading to innovations in culturally- and linguistically-appropriate care.

9.1: Goals for this Module (also known as learning outcomes)

9.2: Chapter 10 in ICPH- Community and Public Health and Racial/Ethnic Populations

9.3: Race, Ethnicity, Culture, and Nationality

9.4: Cultural Groups and Formation of a Cultural Identity

9.5: The Role of Culture in Shaping Health Beliefs and Practices

9.6: Racial and Ethnic Classifications

9.7: Issues with Data and with the Classifications

9.8: Snapshots of the Health of Racial and Ethnic Groups in the US

9.9: Americans of Hispanic Origin- Health overview and leading causes of death

9.9.1: The Latino Paradox

9.9.2: Becoming American- episode of Unnatural Causes

9.10: African Americans- Health overview and leading causes of death

9.11: Asian Americans and Pacific Islanders- Health overview and leading causes of death

9.12: American Indians and Alaska Natives- Health overview and leading causes of death

9.13: Immigrant and Refugee Health

9.14: Minority Health and Health Inequities (disparities)

9.15: Health Disparities in Specific Health Conditions

9.16: Social Determinants of Health and Racial and Ethnic Disparities in Health

9.17: And now... cultural competence and cultural humility

9.18: Cultural Competency

9.19: Cultural Humility

9.20: Cultural Barriers to Care

9.21: Culturally and Linguistically Appropriate Services (CLAS) Standards

9.22: Health Inequities in the Pandemic

9.23: What does a successful response look like?

9.24: Additional Resources

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9.1: Goals for this Module (also known as learning outcomes)

Upon completing this Chapter, students will be able to

1. Discuss the diversity of the United States and how that relates to community and public health efforts.
2. Explain the importance of the 1985 landmark report, The Secretary's Task Force Report on Black and Minority Health, as a kind of "wake-up call" for public health and medicine.
3. List the racial and ethnic categories currently used by the U.S. government in statistical activities and program administration reporting (for example, in the 2020 Census) and at least one reason these categories can be controversial.
4. List some limitations related to collecting racial and ethnic health data.
5. Discuss a few socio-demographic characteristics of "minority groups" in the United States.
6. Give examples of ways public health and other institutions work to overcome racial health inequities, for example, the components of the Race and Health Initiative discussed in your textbook.
7. Explain the role that socioeconomic status plays in health inequities among racial and ethnic groups.
8. Define cultural competence, linguistic competence, and cultural humility, noting their similarities and differences
9. Discuss the importance of culturally and linguistically competent care (as described in the CLAS standards and other definitions), along with the concept of cultural humility, in community and public health efforts
10. Discuss the "immigrant paradox" or "Latino paradox" in health outcomes and how it changes over time as immigrants reside in the US for longer, as well as how global health trends may shift this paradox in the future.Discuss ways the COVID-19 pandemic affects diverse ethnic and racial groups in the US differently.
11. Describe at least one initiative to help reduce the health inequities associated with Covid-19.

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9.2: Chapter 10 in ICPH- Community and Public Health and Racial/Ethnic Populations

Please read or skim Chapter 10 in the ICPH Textbook.

It does a decent job of highlighting the health status of leading non-white racial groups (African American, Asian American, Native American, Pacific Islanders) and the Hispanic (Latino/a/x) ethnic group which encompasses people of Latin American heritage of all races. It points to the importance of cultural and linguistic competency, and the need to examine socioeconomic status as one major social determinant of health inequalities in the United States.

it does sometimes fall into over-generalizations and this is a common trap when discussing differences in health status. One option you have in the Discussion this week is to CRITIQUE this chapter and point out how it could be better.

In the chapter, the first section gives an overview of the diversity of the United States, and of the health of various communities. As you read this section, consider the following questions:

1. What racial and ethnic categorizations are used in the U.S. on the Census and in most national health research? How have these categories changed over time?
2. What are some of the gaps or limitations in the data collected about race and ethnicity? why might it be hard to get accurate data sometimes?
3. What stands out for you in the brief overviews of the health status of each of these communities or populations?

- People of Hispanic origin (Latinos/as/x)
- African Americans
- Asian Americans
- Pacific Islanders
- Native Americans and Alaskan Natives
- Immigrants and refugees (of all backgrounds)

The next section of the chapter begins to look at racial and ethnic health disparities, along with public health initiatives to improve health and overcome those disparities. Among these you will find:

1. The Race & Health Initiative and its priority areas
2. Socioeconomic status and its connection to heatlh
3. Cultural competence and the CLAS Standards for Culturally- and Linguistically-Appropriate Care
4. The importance of empowerment at the community and individual levels

> **In the next few pages we'll walk through the main ideas in Chapter 10, before getting into some additional material related to this topic.**

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9.3: Race, Ethnicity, Culture, and Nationality

Learning Objectives

By the end of this section, you should be able to:

- Describe the racial and ethnic makeup of the United States.
- Explain the concept of diversity.
- Identify the groups utilized in diversity calculations.
- Discuss the ways in which race and ethnicity describe diversity.
- Differentiate between race, ethnicity, culture, and nationality.

Diversity in the the United States is not new. Before the country's founding, Native Americans lived in what is now the United States, and settlers immigrated from England, France, Germany, the Netherlands, Poland, Scotland, and other European countries. At the start of the American Revolutionary War in 1775, "more than 250,000 Native Americans lived east of the Mississippi River. They formed more than 80 nations and spoke dozens of languages and dialects" (Museum of the American Revolution, n.d., para. 1).

The U.S. population continues to increase—by 2060 it is projected to number 417 million, and as the population grows, it is becoming increasingly more diverse (U.S. Census Bureau, n.d.). To meet the needs of this multicultural population, nurses must recognize and appreciate the differences in health care values, beliefs, and customs in a diverse society.

The Difference Between Race, Ethnicity, Culture, and Nationality

Race, ethnicity, culture, and nationality are distinct but interconnected concepts that influence how individuals identify and interact. Race is a form of social categorization often based on physical appearance, while ethnicity is tied to social and cultural affiliations (A. García, 2018; J. D. García, 2020). Culture is a broader concept that encompasses learned and shared patterns of behavior, and nationality pertains to one's country of citizenship. These factors can influence human behaviors, beliefs, values, and interactions in a community (Smith & Bond, 2019).

Though these terms have distinct meanings, they are often used interchangeably. As discussed in Structural Racism and Systemic Inequities, race is a societal construct that is commonly defined by physical characteristics, such as bone structure, skin, hair, or eye color, as well as social factors and cultural backgrounds. However, race is not biologically predetermined, and different racial categories may not reflect shared genealogy. Unlike heritage or ancestry, race is assigned rather than inherent or chosen. It is a dynamic and evolving concept that is influenced by historical, societal, and political contexts (Jones & Bullock, 2019). The use of racial categories in demographic counts can be traced back to the 1790 U.S. Census.

Race: A Myth and an Illusion

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this YouTube Video online

Though racial categories have been used in the U.S. Census for hundreds of years, these categories are social constructions, rather than biological facts.

Read RACE: The Power of an Illusion, watch the video "The Myth of Race, Debunked," and then respond to the following questions.

1. How have racial definitions changed over time?
2. How do demographic shifts and the sociopolitical climate influence the definition of racial categories?
3. What, if anything, surprised you in this video?

Unlike race, the social and cultural groups one belongs to determine their ethnicity. Ethnicity is a fluid concept rooted in shared cultural traits such as language, religion, nationality, history, or other cultural factors that bind individuals into distinct social groups. Ethnicity is inherited and shared among a group. Like race, the definition of ethnicity evolves over time and can be broadly or narrowly constructed. While everyone is "born into" certain features of ethnicity, personal experiences and societal influences can reshape these characteristics (A. García, 2018; J. D. García, 2020).

Culture has no single definition and is both universal and personal. Definitions in the literature indicate that culture:

- is learned, shared, and transmitted (McFarland, 2018);
- involves patterned responses to behavior (Giger & Haddad, 2021);
- is a historically transmitted pattern of meaning (Forbes & Mahan, 2017);
- is a learning process (Spradley et al., 2016); and
- distinguishes the members of one group of people from others (Hofstede, 2011).

Nationality denotes an individual's country of citizenship. In the 19th century, nations were formed based on ethnic nationalism, which presumed a shared ethnic origin among their people. Examples include Britain, Germany, Italy, and Sweden. Table 21.1 compares the concepts of race, ethnicity, culture, and nationality.

Social and cultural factors play a significant role in shaping the dynamics of societies. These factors encompass a broad range of elements that influence human behaviors, beliefs, values, and interactions in a community (Smith & Bond, 2019).

Table 21.1 Comparison of Race, Ethnicity, Culture, and Nationality

	Race	Ethnicity	Culture	Nationality
Definition	A social construct used to categorize or divide individuals based on physical traits, social factors, and cultural backgrounds; not biologically based	Based on everyday ancestral, cultural, national, and social experiences	Based on beliefs, values, norms, and practices that are learned and shared generation by generation	Refers to the country of citizenship
Examples	Black, White, Asian, etc.	Albanian, Amish, Cherokee, English, Polish, Libyan, etc.	American culture, Arab culture, British culture, etc.	Afghan, Chinese, Cuban, Italian, French, etc.

The Racial and Ethnic Makeup of the United States

Over the last 100 years, the racial and ethnic makeup of the United States has changed dramatically. In fact, in just 10 years, the country has experienced a 276 percent growth in the population of people identifying as two or more races (Jones et al., 2021). While these changes may be due, in part, to a change in the way the the 2020 U.S. Census framed questions about racial and ethnic identification, both the change in the way the questions were asked and the responses suggest a shift in the way Americans think about their racial and ethnic identities toward the embrace of more nuanced multiethnic and multiracial identities. In 2021, the United States was more diverse than in 2010, with the Hispanic/Latino population growing the most, increasing by 2.5 percentage points to 18.9 percent. Conversely, the White, non-Hispanic/Latino population experienced the most significant decrease, dropping by 4.5 percentage points to 59.3 percent. As discussed in Demographic Trends and Societal Changes, the United States will become a majority-minority nation by mid-century because of a decreasing non-Hispanic White population and an increasing minority population (USAFacts, 2022) (Figure 21.2).

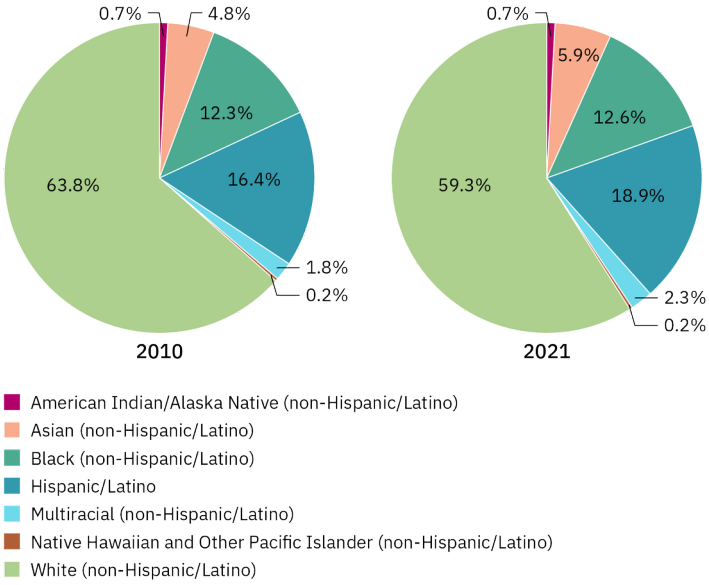


Figure 21.2 Between 2010 and 2021, the Hispanic/Latino populations grew the most, increasing by 2.5 percentage points to 18.9 percent. The White, non-Hispanic/Latino population had the most significant decrease, dropping by 4.5 percentage points to 59.3 percent. (data source: U.S. Census; attribution: Copyright Rice University, OpenStax, under CC BY 4.0 license)

Diversity refers to the relative size and representation of different racial and ethnic groups—the heterogeneous rather than homogenous nature of the mix of these groups in a population. The U.S. Census uses the following groups in its diversity calculations (Jensen et al., 2021):

- Hispanic/Latino
- White alone, non-Hispanic/Latino
- Black or African American alone, non-Hispanic/Latino
- American Indian and Alaska Native alone, non-Hispanic/Latino
- Asian alone, non-Hispanic/Latino
- Native Hawaiian and other Pacific Islander alone, non-Hispanic/Latino
- Some other race alone, non-Hispanic/Latino
- Multiracial, non-Hispanic/Latino

The United States is a heterogeneous society, with people from various ethnicities, cultures, and religions coexisting. Belgium is a European example of a heterogenous society. Belgium is known for its linguistic diversity, with three official languages: Dutch (Flemish), French, and German. The country is divided into distinct regions, including Flanders, Wallonia, and the Brussels-Capital Region, each with its own language and cultural characteristics. In addition to these linguistic divisions, Belgium is home to immigrant communities from various countries, further contributing to its heterogeneous nature (Droixhe & Gsir, 2017). India is another example of a heterogenous society. According to the most recent Census of India data, from 2011, the country has 30 different native languages. The most spoken language, Hindi, is spoken by just 43.6 percent of the population. The next five most spoken languages are Bengali (8 percent), Marathi (6.9 percent), Telugu (6.7 percent), Tamil (5.7 percent), and Gujarati (4.6 percent) (Office of the Registrar General and Census Commissioner, India, 2011). In terms of religious diversity, while the country is more than 80 percent Hindu, it also has large Buddhist, Jain, and Muslim populations and the largest Sikh population in the world (Kramer, 2021). In 2012, the U.S. State Department estimated that there were more than 2,000 ethnic groups in India (U.S. Department of State, 2012).

In contrast, countries such as Japan and South Korea are primarily made up of one dominant culture, making them homogeneous societies. Japan is predominantly made up of people of Japanese ethnicity, though there are also minority groups such as Ainu, Ryukyuan, and Korean communities that contribute to the country's cultural diversity. South Korea is also primarily comprised of people of Korean ethnicity, with other minority groups making up a smaller proportion of the population.

The coexistence of diverse religious, ethnic, or cultural groups in a society, all adhering to the same rules, is called multiculturalism (Longley, 2021). In contrast, in cultural pluralism, there is one dominant society in which all minority groups participate fully (Clayton, 2020). *Pluralism* refers to multiple cultures existing in the same place with their own unique traditions and regulations. There is typically a dominant culture in pluralism, whereas no single culture holds more importance than the others in multiculturalism.

The success of immigrants in their new countries is greatly influenced by their ability to assimilate, integrate, and/or adapt. The United States is often associated with multiculturalism because of the religious, ethnic, and cultural diversity of its population. However, as a pluralistic rather than truly multicultural society, the United States has a dominant culture and allows minority groups to maintain their unique identities in the larger society. This coexistence of a dominant culture and diverse minority groups can result in positive aspects, such as cultural enrichment, but it can also create challenges, including differential treatment and variations in societal rules (Ziólkowska-Weiss, 2020). Despite efforts to promote inclusivity and tolerance, disparities may persist due to deep-rooted structures and systemic issues (Solomon et al., 2019). These issues are discussed in more detail in Structural Racism and Systemic Inequities.

While *race* and *ethnicity* are commonly used terms to describe diversity, they do not necessarily describe a person's cultural identity. A person can have multiple racial and ethnic backgrounds, and reducing culture to a broad categorical or dichotomous variable in a culturally pluralistic society can hide the individual differences that exist in groups of people. Therefore, it is essential to recognize the underlying intragroup variations and acknowledge the complexity of cultural identity in a diverse society (Singer, 2012; Singer et al., 2016). Culture is much more than a racial or ethnic category.

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9.4: Cultural Groups and Formation of a Cultural Identity

Learning Objectives

By the end of this section, you should be able to:

- Explain the concept of culture.
- Distinguish between nonmaterial and material culture.
- Identify cultural traits.
- Describe the visible and invisible elements of culture.
- Differentiate between individualistic and collective cultural traits.

As discussed previously, culture has no single definition and is both universal and personal. The best way to conceptualize culture is as a set of learned patterns of beliefs, behaviors, ideas, philosophies, and practices that are shared. These cultural elements are not constant but are formed throughout an individual's lifetime.

Cultural Groups, Patterns, and Expression

A cultural group shares a core set of beliefs, patterns of behavior, and values. These groups may be large or small, but their thinking and behavior identify them. Cultural groups are defined by not only racial or ethnic background but also by linguistic, religious, spiritual, geographical, and/or sociological characteristics (Office of Minority Health, 2013). Cultural groups consist of subcultures, also known as aggregates; a subculture shares distinguishing characteristics that may identify with aspects of its larger parent culture. For example, children born between the early 2010s and the mid-2020s are part of Generation Alpha, a subculture based on generation.

Cultural patterns of behavior are socially acquired, not genetically inherited. Patterns specific to a particular culture are learned through the process of enculturation. Social institutions such as the family, religion, the education system, peer groups, community, and the media play a role in enculturation. Each culture shares a particular set of cultural traits, such as rituals, which serve as the fundamental structures of culture. Cultural traits are material (objects or artifacts) and nonmaterial (ideas or values). In each culture, thousands of cultural traits influence identity formation (Fabietti, 2016). Over time, the shared beliefs, values, and norms create cultural patterns that distinguish the group from other cultures.

Culture is like an iceberg with visible and hidden elements (Figure 21.3). Visible cultural elements include dress, food, language, and art. Visible elements are tangible. However, visible elements only make up about 10 percent of cultural identity. The other 90 percent is made up of hidden or invisible elements. Invisible elements are the intangible parts of a culture, such as communication styles, rules, etiquette, views of time and space, and emotional regularity (Hall, 1976). These elements are the most powerful features of culture, shaping perceptions, attitudes, beliefs, and values. Culture informs beliefs regarding what is true and false; values of right and wrong; attitudes, including likes and dislikes; and behaviors. It is from these cultural influences that people's identities are formed (University of Minnesota Libraries Publishing, 2016).

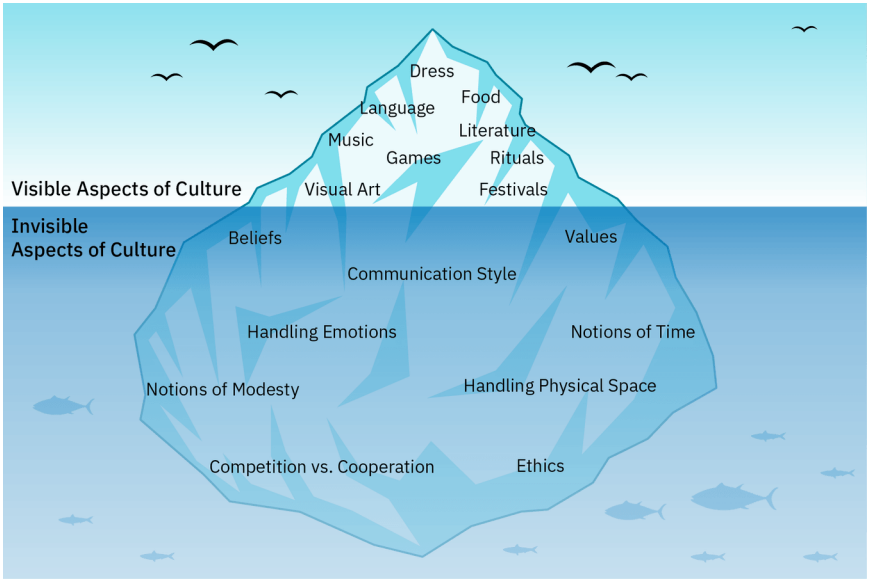


Figure 21.3 Culture has visible and invisible elements. (CC BY 4.0; Rice University & OpenStax)

Culture informs how one is socialized to interact with other people and communities. For example, in an individualistic culture, individuals are socialized to be independent and psychologically separate from others. In comparison, collectivist cultures encourage interdependence and promote the interests of the collective over the individual (Fatehi et al., 2020).

For example, Western cultures, including the United States, emphasize the *self* as independent and separate from others. This independence is expressed by focusing on *self*-goals, wishes, and desires. Common expressions in an individualistic culture are *self-fulfillment* and *self-actualization*. In comparison, some Asian cultures emphasize interdependence and fitting in to maintain harmony (Fatehi et al., 2020).

People express their culture in a variety of ways. Examples are traditions, symbols, clothing, foods, and ways of doing things or behaving. From a theoretical perspective, there are two types of culture: nonmaterial and material. Nonmaterial, or symbolic, culture includes elements such as values, beliefs, symbols, and languages. In contrast, material culture relates to physical objects such as clothing, utensils, and tools.

Cultural Identity

Personal identity is influenced by the cultural groups an individual belongs to that form their social identity. These cultural groups may be involuntary (family) or voluntary (book club). Social identities represent who an individual is and who they are not. Food, clothing, celebrations, and religion are all manifestations of culture, and each plays a role in shaping and reinforcing cultural identity and community. The interconnection of an individual's cultural, personal, and social identities helps form their self-concept and their cultural identity.

- Food: Different cultures have different culinary traditions in the types of popular foods and the ways of preparing and consuming food. For example, in many parts of Asia, it is customary to eat with chopsticks, while in the Western world, using a fork and knife is more common. In some cultures, it is considered rude to waste any part of an animal when cooking. Some cultures also believe that certain foods or drinks have medicinal or spiritual properties.
- Clothing is another important aspect of culture; different cultures have different dress codes and styles. For example, in some cultures, it is customary for women to cover their heads or wear long dresses or skirts, while men in some cultures wear traditional robes or hats.
- Holidays and celebrations: Different cultures celebrate various holidays and festivals that are significant to their beliefs, history, and traditions. For instance, the Lunar New Year is a major holiday celebrated across Asia and many other parts of the world. Recognizing its importance, New York State has officially declared the Lunar New Year a public school holiday through legislative approval (New York State, 2023).
- Religious practices: Religion plays a vital role in many cultures, and different religions have their own rituals and practices. For example, Muslims are expected to pray five times a day facing Mecca, while Hindus perform puja ceremonies and offer food and flowers to their deities.

Social Organization

Social organization, or how societies are structured and organized, influences culture, from the distribution of power and resources to the values and beliefs transmitted through education.

Here are a few ways in which social organization can influence culture:

- Power structures: The distribution of power and authority in a society can impact cultural practices. For example, in societies where power is concentrated in the hands of a few, cultural practices may reflect and reinforce this power dynamic. Similarly, cultural practices may reflect a more egalitarian ethos in societies where power is more broadly distributed.
- Social hierarchies: Whether and how social groups are organized and ranked in a society can also shape cultural practices. For example, in societies with rigid caste systems or class hierarchies, cultural practices may reflect and reinforce these social distinctions. In societies with more fluid social hierarchies, cultural practices may be more diverse and flexible.
- Economic systems: How resources are produced, distributed, and consumed in a society influences cultural practices. For example, cultural practices may be more individualistic and consumer-oriented in societies with advanced capitalist economies. In contrast, cultural practices in societies with more collectivist or communal economic systems may focus more on community and shared resources.
- Education: Attitudes regarding education can shape cultural practices. For example, in societies where education is valued and accessible, cultural practices may emphasize learning and intellectual pursuits.

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9.5: The Role of Culture in Shaping Health Beliefs and Practices

Learning Objectives

By the end of this section, you should be able to:

- Explain the cultural significance of health.
- Assess how culture influences health.
- Describe how the cultural environment informs cultural development.

The World Health Organization (WHO) introduced the modern understanding of health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" in its constitution in 1948 (Svalastog et al., 2017). In 1986, the Ottawa Charter, signed at the First International Conference on Health Promotion, proposed that health is created in the context of everyday life and environment, where people live, love, work, and play. Societies have historically recognized health as not just the absence of disease but a state of internal harmony. Beliefs about how harmony is created and maintained distinctly influence views on the causes and effects of illness, health-seeking behavior, healing practices, coping mechanisms, and treatment modalities. These views influence one's sense of control over health, illness, and death.

Historical Views of Health Informing Health-Related Belief Systems

During the period known as ancient Greece, which spanned from the beginning of the Greek Dark Ages around 1200 BCE to the fall of the Western Roman Empire around 600 CE, health was viewed as a harmony between an individual and their surroundings, a unity of both body and soul. Greek philosophy placed great importance on maintaining a healthy body and mind. The Greeks viewed the origin of disease as connected with the geographical and atmospheric environment. In ancient Greece, treatment modalities focused on natural preparations, such as seawater, honey, vinegar, rainwater, and medicinal plants (Kleisiaris et al., 2014).

In East Asian traditions, health results from the unity of body, mind, and spirit, with disease resulting from being off balance. Yin and yang are the underlying principles of Chinese philosophy and medicine. Good health is believed to come from a balance of yin (negative, dark, and feminine) and yang (positive, bright, and masculine) (National Library of Medicine, 2023). The concept of harmony and unity of yin and yang is still practiced today. In some traditional African cultures, health is a balance between the mental, physical, spiritual, and emotional well-being of self, family, and community. Good health includes the ancestors' health, as the ancestors are responsible for keeping the living healthy. Disease is viewed as the result of evil attacks (including spell casting and witchcraft), bad spirits, or punishment by ancestors. Therefore, health is achieved by balancing the visible and invisible worlds (White, 2015). Traditional African practices have influenced views of health and disease globally. For example, Indigenous African beliefs gave rise to the Vodun or Vodou religion (Auguste & Rasmussen, 2019).

Similarly, Native Americans have traditionally believed that physical and spiritual health are connected. To overcome illness, the body and the soul must heal together. Healing ceremonies include prayer, chants, drumming, storytelling, songs, and sacred objects. Concepts of the Spirit, the Creator, and the universe are central to Native beliefs (National Library of Medicine, n.d.-a). The medicine wheel, also called the sacred hoop, has been used by generations of Native American tribes (National Library of Medicine, n.d.-b). The medicine wheel is symbolic of health and the cycles of life. Each tribe has its own interpretation of the medicine wheel, and such wheels continue to be used today. For example, the Medicine Wheel and 12 Steps recovery program is a culturally appropriate 12-step recovery program for Native Americans and Alaska Natives, based on the cycle of life and the four laws of change depicted by the wheel.

Conversations About Culture: Medicine Wheel Teaching with Elder Elsey

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this YouTube Video online

In this video, Elder Elsey Gauthier speaks about the medicine wheel concept.

Watch the video, and then respond to the following questions.

1. What do the four quadrants of the medicine wheel represent?
2. What is the significance of ceremonies?
3. Describe what it means to be part of the same circle.

The writings of Plato, Aristotle, and Hippocrates influenced the understanding of health in many societies. Plato (429–347 BCE) viewed health as internal harmony and harmony with the physical and social environment. Aristotle associated health with the four basic qualities: hot, cold, wet, and dry. These qualities characterize the four elements, four humors, and four temperaments and serve as the foundations for all notions of balance and homeostasis in ancient Greek medicine. Aristotle emphasized society's role in achieving its harmonious functioning and preserving its members' health (Svalastog et al., 2017). He associated health with the supreme good for humanity, or *eudaimonia*, a philosophical term utilized today as "human flourishing." Hippocrates, widely recognized as the father of medicine, proposed that health depended on the human constitution, proper diet, and exercise. The concept of harmony between the individual, social, and natural environments informed the current holistic health view. Such concepts are reflected in the Hippocratic oath (Kleisiaris et al., 2014).

How people understand health and illness, their beliefs about disease causes, and their strategies to maintain health can vary greatly depending on cultural factors such as beliefs, values, and social norms. For example, in some cultures, physical and mental health are viewed as interconnected, and holistic approaches to health care are preferred, which may include traditional healing practices, meditation, or herbal remedies. In other cultures, medical treatments may be more focused on addressing specific symptoms, rather than considering the overall health and well-being of the individual.

The Cultural Environment

An individual's cultural environment refers to the social, economic, political, and historical factors that shape their experiences and beliefs in a particular culture. This includes the language they speak, the values they hold, the traditions they follow, and the cultural practices they engage in. The cultural environment also includes a culture's social and institutional structures, such as family dynamics, religious institutions, and political systems. The cultural environment can be defined as ecological systems at various levels: microsystems, mesosystems, exosystems, macrosystems, and chronosystems.

The microsystem level consists of the immediate environment in which an individual interacts, including family, friends, and other close relationships. Cultural factors at this level may include family traditions and beliefs, cultural values, and customs related to health and wellness.

The mesosystem level refers to the interactions between different microsystems. For example, at the micro level, family organization influences routine practices essential to psychological health and well-being. Family rituals foster a sense of belonging and personal identity (Fiese et al., 2002). Sharing meals can be an essential family ritual that helps create a sense of togetherness and belonging. Mealtime rituals such as saying grace or having a family member cook a particular dish can be meaningful and reinforce family traditions. Community-level networks promote an individual's and family's physical, psychological, social, and spiritual well-being (Figure 21.4).

Social organizations can affect how community members interrelate, cooperate, and support one another and influence expectations of support norms and social controls that regulate behavior and interaction patterns (Mancini & Bowen, 2013). Cultural factors at this level may include communication styles, expectations around health care, and cultural beliefs related to health and illness.



Figure 21.4 The mesosystem level includes community gatherings, such as this Thanksgiving dinner, which was shared by over 900 members of the Presidio of Monterey military community in California. (credit: "Thanksgiving 2015" by Catherine Caruso/Presidio of Monterey Public Affairs/Flickr, Public Domain)

The exosystem level refers to the external systems and institutions that influence an individual's life, such as the health care system, educational system, and media. Cultural factors at this level may include access to culturally appropriate health care, cultural stereotypes, and media portrayals of health and wellness.

The macrosystem level refers to the broader cultural context in which an individual lives, including societal beliefs, values, and norms. Macrosystems can influence access to resources, including health care. For example, immigration policies may make it difficult for migrant workers and immigrants to seek care due to fear of deportation (Toney et al., 2022). In the United States, immigrants are only eligible to receive benefits or have coverage after being "qualified," frequently termed a waiting period. In addition, to qualify for Medicaid and the Children's Health Insurance Program (CHIP), a lawful permanent resident (LPR), also known as a green card holder, must have at least 5 years of residence in the United States (Turner, 2023). See Caring for Vulnerable Populations and Communities for more information. Cultural factors at this level may include cultural attitudes toward health and wellness, cultural norms related to health behaviors, and policies and laws related to health care access.

The chronosystem level refers to the influence of time and history on an individual's cultural experiences, including generational and historical changes in cultural beliefs and practices related to health and wellness.

The cultural environment shapes an individual's perception of the world and influences behavior, including health behavior. It influences perceptions of health, illness, and death; coping mechanisms; and the experience and expression of illness and pain (Agency for Healthcare Research and Quality, 2020).

Cultural Beliefs and Practices Related to Health and Illness

Different cultures have unique beliefs and practices regarding health, illness, and healing, which can influence how individuals approach and manage their health. Health beliefs influence how people think and feel about their health and health problems, when and from whom they seek health care, how they respond to health care interventions, and how well they adhere to treatment (Swihart et al., 2023). For example, in some cultures, people believe that talking about a possible poor health outcome will cause that outcome to occur.

Death and Dying

Different cultures have unique beliefs and practices regarding death, mourning, and the afterlife, which can influence how individuals approach the end of life. In some cultures, mourning may involve specific rituals or customs, such as wearing specific clothing, preparing the deceased, or observing specified periods of mourning. In other cultures, mourning may be less formalized or structured (Giger & Haddad, 2021).

Conversations About Culture: Death and Dying: Cultural and Religious Perspectives

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this YouTube Video online

This video delves into death, exploring the concept and how cultural and religious perspectives shape our understanding of it.

Watch the video, and then respond to the following questions.

1. How do different cultures conceptualize death, and in what ways do these conceptualizations impact individuals' views on end of life, readiness to die, and funeral rituals?
2. How does death anxiety manifest across various cultures, and in your opinion, do cultural factors contribute to or alleviate this anxiety?
3. How do different religious beliefs influence funeral practices and rituals in the context of death?
4. Select an example of a funeral ritual from the video and describe how it reflects cultural values and beliefs.

Coping Mechanisms

Coping mechanisms are the strategies and behaviors that individuals use to manage stress and difficult situations. Various cultures have unique coping mechanisms that reflect their values, beliefs, and practices. For example, some cultures may use spiritual practices, such as prayer or meditation, to cope with stress or illness. Others may rely on social support networks like family or community members (Giger & Haddad, 2021).

Perception and Reporting of Illness

Culture can shape how individuals perceive and report symptoms. For example, some cultures may view mental health symptoms (such as depression) as a sign of weakness or moral failing and may be less likely to seek help or report these symptoms. In contrast, other cultures may prioritize mental health and view seeking help as a sign of strength. Differences also exist regarding the meaning of an illness and whether an illness is "real" or "imagined" (Giger & Haddad, 2021).

Pain and Discomfort

Many cultures have unique beliefs, values, and practices that shape their experiences of pain and discomfort. For example, in some cultures, it may be common to downplay or minimize symptoms of illness or pain. This may be due to a cultural belief that expressing vulnerability or weakness is undesirable or that complaining about pain is a sign of ingratitude. In contrast, other cultures may encourage individuals to be vocal about their pain and discomfort to seek help and support from others (Giger & Haddad, 2021).

Conversations About Culture: Cultural Influence: Perception of Pain

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this YouTube Video online

This video depicts the interaction between a health care provider and Carlos, a postoperative client. It addresses issues associated with making assumptions and emphasizes the importance of listening to the client.

Watch the video, and then respond to the following questions.

1. How does culture influence pain response and expression?
2. Could the physician have responded differently to Carlos's request? If so, how?
3. How do assumptions regarding drug-seeking behavior impact client care?

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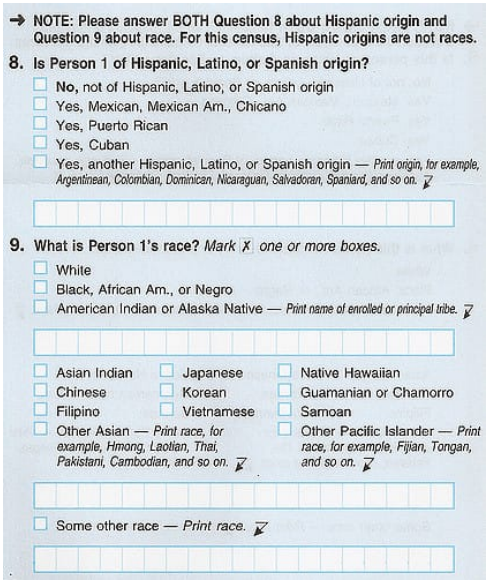
9.6: Racial and Ethnic Classifications

The textbook uses the term "**minority**," a term that has fallen out of common use. Technically speaking, "**minority**" simply means "those with characteristics found in less than 50% of a population," and "**majority**" simply means "those with characteristics found in more than 50% of a population."

- In 2014, 62.2% of Americans self-identified as white, non-Hispanic
- By 2060, over one-half of the U.S. population will be composed of racial minorities (people of color)

Minority Groups (in the terminology used in the ICPH textbook) are subgroups of the population that consist of fewer than 50% of the population. However, I think it's important to point out that globally, non-White populations are the majority in the world!

At least six states are now "majority minority" states, meaning that non-Hispanic whites make up less than 50% of the population and people of color make up more than 50% of the population (although it may be that no single ethnic or racial group makes up 50+% of the popuation). As of 2019, these states include Hawaii (which never had a white majority), Texas, California, Nevada, New Mexico, and Maryland. As many more states have a majority of children who are non-White, we can see that the country is trending toward greater diversity, not less.



➔ NOTE: Please answer BOTH Question 8 about Hispanic origin and Question 9 about race. For this census, Hispanic origins are not races.

8. Is Person 1 of Hispanic, Latino, or Spanish origin?
- ☐ No, not of Hispanic, Latino, or Spanish origin
- ☐ Yes, Mexican, Mexican Am., Chicano
- ☐ Yes, Puerto Rican
- ☐ Yes, Cuban
- ☐ Yes, another Hispanic, Latino, or Spanish origin — *Print origin, for example, Argentinean, Colombian, Dominican, Nicaraguan, Salvadoran, Spaniard, and so on.*

9. What is Person 1's race? *Mark ☒ one or more boxes.*
- ☐ White
- ☐ Black, African Am., or Negro
- ☐ American Indian or Alaska Native — *Print name of enrolled or principal tribe.*
- ☐ Asian Indian
- ☐ Chinese
- ☐ Filipino
- ☐ Japanese
- ☐ Korean
- ☐ Vietnamese
- ☐ Other Asian — *Print race, for example, Hmong, Laotian, Thai, Pakistani, Cambodian, and so on.*
- ☐ Native Hawaiian
- ☐ Guamanian or Chamorro
- ☐ Samoan
- ☐ Other Pacific Islander — *Print race, for example, Fijian, Tongan, and so on.*
- ☐ Some other race — *Print race.*

Questions from Census 2010

Racial and Ethnic Classifications

Race is defined as "The categorization of parts of a population based on physical appearance due to particular historical, social, and political forces."

It is important to note that race is not a biological category -- it is a social one. This is a new idea to some people. Race is most certainly important often to a person's history, social opportunities, and sense of identity. We have seen that racially-sorted opportunities in a society have *biological effects* -- this is the idea of embodiment we saw in the Lesson on Social Determinants of Health. But race is not a meaningful category when we look at people *genetically*. There is no gene that all people of one race have yet all people of another race do not have -- no distinguishing gene. Consider these two quotes from the article "Race Is a Social Construct, Scientists Argue: Racial categories are weak proxies for genetic diversity and need to be phased out," by Megan Gannon, LiveScience on February 5, 2016 (Scientific American website):

"What the study of complete genomes from different parts of the world has shown is that even between Africa and Europe, for example, there is not a single absolute genetic difference, meaning no single variant where all Africans have one variant and all

Europeans another one, even when recent migration is disregarded," Pääbo told Live Science. "It is all a question of differences in how frequent different variants are on different continents and in different regions."

In one example that demonstrated genetic differences were not fixed along racial lines, the full genomes of James Watson and Craig Venter, two famous American scientists of European ancestry, were compared to that of a Korean scientist, Seong-Jin Kim. It turned out that Watson (who, ironically, became ostracized in the scientific community after making racist remarks) and Venter shared fewer variations in their genetic sequences than they each shared with Kim.

We see that genetically-speaking, not only are we all more alike than not (over 95% of our genes are shared), but the variations that exist are *not necessarily*more likely to be shared among people of the same race. In fact, the area with the greatest genetic variety is Africa -- the continent that humans have inhabited the longest -- yet in US racial categories, all Africans are considered to belong to a single race.

Geographic origin may play a larger role in determining genetic similariities and adaptations. For example, there are more genetic similarities among Vietnamese people who share a history of living in a single geographic area for centuries than there are among Asians as a group.

Ethnicity refers to a subcultural group within a multicultural society, often based on tribal affiliation or national origin. The textbook highlights **six main features of ethnicity:**

- A common name that identifies the community
- A myth of common ancestry that includes the idea of common origin in time and place and that gives a sense of kinship
- Shared historical memories and commemorations of key events and heroes
- One or more common elements of culture such as religion, customs and language
- A link with a homeland, physical or symbolic
- A sense of solidarity on the part of at least some people in that ethnicity

A comment on ethnic myths and identifications among White Americans

White ethnicities in the US have mainly been analyzed as a question of national origin -- for example, Irish Americans and Polish Americans. Some white ethnicities have been drawn to certain industries, for example, or settled certain neighborhoods and faith institutions.

Reading the characteristics of an ethnicity, I would add that there is a loud minority of whites who identify with a Confederate ethnicity -- common myth, common heroes, etc. Even many whites whose family origins lie in the North or West now display the Confederate battle flag used by the South in the Civil War and use terms like "white pride". I think everyone has a right to be proud of their ethnicity and experience the self-love and acceptance that can come with that -- but I think it is urgent business for white people (like myself) to lift up nonracist and anti-racist ways of being white. If I identify wtih any white people of the Civil War era, it is with the abolitionists, not the Confederacy that nearly broke this country in the name of maintaining slavery. If you are interested in this history, PBS has a documentary on the 12 years of Reconstruction that followed the Civil War, a time of greatly expanded rights for Black Americans, and the violent and successful white backlash that followed it.

That white backlash never really ended, nor was it adequately addressed in the US -- and it continues today.

There are hundreds of ethnicities in the US: Liberian-American, Slovenian-American, Italian-American, Puerto Rican, Chicano, Japanese-American, Americans of Chinese ancestry, members of the Navajo nation, and hundreds more. Some people would consider Jewish identity as an ethnicity, not just a religion.

However, in our Census, and therefore in many health statistics, there is *only one recognized ethnicity:* **Hispanic or Latino**. Why is that?

Race and ethnicity are operationalized as a way to provide working definitions. By requiring many government agencies to use common definitions, we can better detect trends in health and socioeconomic status over time. The governmental definitions do not necessarily match how people self-identify. They are somewhat artificial categories. Nonetheless, they are what allow us to track and explore health inequities along racial and ethnic lines. In many areas, additional studies are needed to better understand differences *within* ethnic or racial groups. Here is an example of diverse health outcomes *among* diverse Asian American populations.

U.S. Classification standards have changed over time. In fact, the categories have almost never been identical in two Censuses since 1790. However, 2020 was the first time that the exact same categories are used a second time -- the categories from 2010 were used in the 2020 Census. That doesn't sound controversial, but it actually is -- see discussion on the next page of the Lesson. Also, here is a link to an *optional* article on the U.S. Census and racial categories if you are curious about this topic.

Currently the US government recognizes five races and one ethnicity (Latino or Hispanic). (See Table 10.1 in ICPH) People with Latino or Hispanic ethnicity can be of any race. Here are the five defined races in US government statistics:

- Asian
- Black or African American
- American Indian or Alaska Native
- Native Hawaiian or Other Pacific Islander
- White

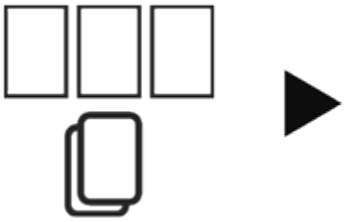
Since the Census in the year 2000, **people can mark that they are of more than one race** on the Census. It is fairly recent that the health of multi-racial individuals has been tracked in statistics -- and as you know, anything not in the data that are collected in a standardized way is likely to be overlooked. It seems like a positive development to me that people can now claim more than one race, if that reflects their family history and social identity.

Official Definitions versus our Common Usage

To understand health statistics, it's important to know how the Census and the government classify race and ethnicity.

However, it's just as important to know that these categories -- and even the distinction of the words race and ethnicity -- **do not match how many people identify or undertand their identity**.

- Many people, for example, would identify their race as Brown -- yet the Census doesn't list that option. Across the US, many people now see Latino/a/x identity as a racial category, not just an ethnic one.
- Other people feel uncomfortable with a racial category that seems to obscure their ethnicity -- for example, there are important differences culturally and in health status among African Americans from different regions of the US, or among those whose families have recently immigrated from diverse parts of Africa and the Caribbean.
- When we consider that around 2/3 of the people in the entire world live in Asia, with tremendous social, historical, cultural and genetic diversity, the assumption of uniformity that comes with a single racial category "Asian" seems ridiculous. Common experiences in the US have helped forge an identity of Asian American, yet for many people, their national origin (e.g. Burmese) or their ethnic origin (e.g., Hmong) forms a greater component of their ethnicity.



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9.7: Issues with Data and with the Classifications

There are limitations to the health data we have. Not only is data sometimes **incomplete** -- for example, undocumented residents not included in some statistics -- but people may identify their race or ethnicity **inconsistently**, especially if they identify wtih more than one cultural or racial group. Also, it is not always clear WHO has filled out the form. Is it the patient or client who fills out the racial or ethnic information on standardized forms, or is it someone else who may report their assumptions?

The Affordable Care Act (ACA) put in place **new rules to upgrade the data collection on race and ethnicity on public health surveys.** See Table 10.2 on page 258 for some examples. Increasing both the amount of data collected and the reliability of the data will help public health organizations meet the Healthy People 2020 goal to "achieve health equity, eliminate disparities, and improve the health of all groups." (Healthy People 2030 has similar goals.)

Every now and then, a proposal is made to get rid of racial categories all together. After all, we all part of the human race! While the racial/ethnic categories we use are definitely problematic and change over time, public health authorities oppose eliminating racial and ethnic categories on health records, birth and deth certificates or the Census. Race is an important social category and shapes the opportunities and experiences in our lives. If we stop collecting data on race or ethnicity, would racism or xenophobia disappear? Would health inequities disappear? Or would we just have a harder time tracking them?



Controversies with the 2020 Census

The Census is a constitutional responsibility and many important decisions ride on the results of the Census every ten years. Congressional districts are drawn based on Census data. Many types of funding are based on population as measured in the Census. Priorities for public health services are influenced by the Census. Allocation of tax money to states and counties and cities also often depends on Census data. On one hand, the purpose of the Census is to get as accurate a count as possible. On another hand or two, however, political influences come into play -- as well as differences of opinion about the best methodology to get an accurate count.



In 2020, there were several controversies about racial and ethnic classification in the 2020 Census.

- One was about the inclusion of **a question about citizenship**. The Trump Administration wanted to include a question on the 2020 Census that asks, for each person listed on a household's Census form, "Is this person a citizen?" Civil rights groups and others contested this idea, saying that it would undermine the goal of an accurate count of all persons living in the United States (citizen or not), as research demonstrates that immigrant households would be less likely to respond to the Census with that question on it. The Supreme Court issued a decision in June 2019 barring the citizenship question (as proposed by the Trump Administration). Further documents have emerged showing that the Trump Administration's intention was to gain electoral advantage for the Republican party. Even with the citizenship question removed, some damage was already done. Immigrants may have been under-counted in the Census, as immigrant households may have feared filling it out.

- A second controversy was less prominent. The Trump Administration **decision to use the 2010 Census categories for race and ethnicity** (the same ones explained in Chapter 10 of ICPH) was seen by social scientists as a poor strategy to capture the ethnic/racial makeup of the United States. How so? For one thing, the categories from the 2010 Census don't align as well as possible with how people actually SEE their own identity. The Obama Administration had developed and tested new questions that allowed people to answer one question on their race/ethnicity, instead of separating out the Hispanic Ethnicity

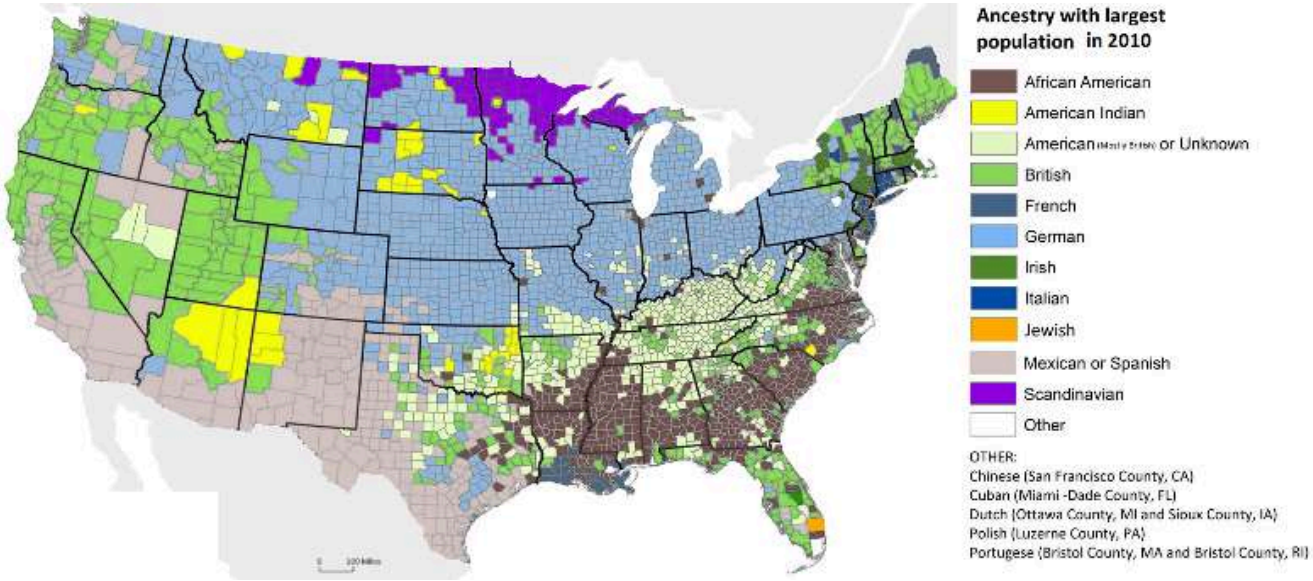
question from race. They had also proposed adding the category of Middle Eastern or North African, allowing people to clearly identify that ethnicity or heritage. (NPR)

- In addition, while starting in 2010, the Census allows people to indicate if they are mixed race, the way the data is used can be problematic. Identity is more complex that can be captured by this category, as noted in this Washington Post article.

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9.8: Snapshots of the Health of Racial and Ethnic Groups in the US

After introducing the idea of how races and ethnicities are categorized in the US, and some problems with the data, the textbook goes on to provide **a quick overview of the health status of the minority racial and ethnic groups in the US**, with the addition of looking at immigrant and refugee health (a population that can include people of all races and all ethnicities).



2010 plurality (meaning the single biggest group even if not a majority) of ancestry in US by County

(Image: Map showing where people in the US come from, based on 2010 Census plurality (meaning the single biggest group even if not a majority) of ancestry in US by County -- Source: Wikipedia Commons)

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9.9: AMERICANS OF HISPANIC ORIGIN- HEALTH OVERVIEW AND LEADING CAUSES OF DEATH

The Hispanic or Latino population is one of the fastest growing ethnic groups and currently the largest minority in the US (17.4% of the US population in 2014). Immigration rates have decreased recently, however, so the rate of growth of this population is also decreasing. Table 10.3 shows the diversity of Latinos in the US by country of origin (or ancestry). The Hispanic population is a young population overall -- in 2012, about 20% of all youth in the US was of Hispanic origin, and that percent is expected to grow to about 33% by 2040. In general, educational levels and income levels are low (median household income of $40,963 in 2013 compared to $58,270 for whites).



Source: US National Parks

Cultural practices regarding health draw on traditions from Spain, native peoples of Latin America and North America, religious customs, and of course, scientific medicine and other medical practices found in the US and in Latin America. See the textbook for a discussion of some of these.

There is an important "Latino Paradox" in health. Despite low socioeconomic status, Latino immigrants in particular tend to enjoy better health than US born people at the same income and educational level. This may be due to the "heatlhy immigrant" trend (people who are sick don't take on the difficult process of immigrating in the first place, only healthy people do), strong family ties and social support, better diet in the home country (that may be lost as immigrants spend more years living in the US), and the experience of growing up in majority-status in one's own country (a factor that does not apply to all immigrants from Latin America -- some were minorities in their home countries).

Leading causes of death -- see ICPH Table 10.4:

1. Cancer
2. Heart disease
3. Accidents (unintentional injuries)
4. Strokes
5. Diabetes
6. Liver diseases
7. Chronic lower respiratory diseases (lung diseases)
8. Alzheimer's disease
9. Influenza and pneumonia
10. Kidney diseases

Photo Source: US National Parks

More on the "Latino Paradox" or the "Immigrant Paradox"

Despite being of low-income on average and despite often fleeing traumatic situations in a homeland or facing violence and difficulty in the process of immigrating, on average, Latino immigrants (as well as many immigrants from other countries) tend to have better health than native-born US citizens. This is referred to as the "Latino Paradox" or the "Immigrant Paradox," when we see better health outcomes than expected just based on social class. Why might this be?

Some of the possible explanations include

- Those who immigrate are healthy to start with -- the sickest or weakest members of families are less likely to take the often-dangerous or at least stressful journey to emigrate from their home country and immigrate to a new one.
- Those who get sick or hurt in the US may return home to be cared for by family back home and/or to die at home -- and therefore they don't appear in the US statistics for health or mortality.
- Some bad health habits are less common among immigrants -- for example, on average immigrants smoke less (especially immigrant women) and they may prefer traditional foods that are healthier than the average US diet.
- Social support -- such as close-knit families, supportive neighborhoods where many people of the same ethnic origin reside, and social norms around sharing resources -- may help off-set the poverty that many recent immigrants find themselves in.
- Relative comfort or relative deprivation -- for some immigrants, even living as a poor person in the US may be more comfortable than living as a poor person in their country of origin. This is not true of all immigrants, of course -- many middle-class immigrants or those who had a profession in their home country find themselves living with much less in the US, relatively speaking. Still, many immigrants expect that they will sacrifice in order for their children to have a chance at a better life. How we perceive social inequality is important, as well as the inequality or relative deprivation itself.
- Being raised in a country with a different racial hierarchy (or no racial hierarchy) -- we have seen that racism has a profound effect on health in the United States. Many immigrants were raised in countries where, while they may have faced discrimination based on poverty, gender or other markers, they did not experience racism at a young age. (Of course, this is not true of all immigrants -- there is racism in many parts of the world.) Having a period of one's life free of racism could be beneficial to health.
- There is some evidence that Latinos age less quickly, compared to other groups. However, we don't yet know why this might be so. Genetic and/or epigenetic causes are being investigated. Epigenetics are a result of the interaction of hereditary traits and environment.

It is worth noting that the "Latino Paradox" does not apply to every single disease or form of injury, and it doesn't apply to every individual, of course. There are even articles now questioning whether it exists at all! Yet many public health workers still point to the "Immigrant Paradox" or "Latino paradox" and try to identify the characteristics of immigrant communities that promote health. Close family ties and social support, for example, can be helpful to the health and well-being of all residents.

9.9.1: The Latino Paradox

9.9.2: Becoming American- episode of Unnatural Causes

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9.9.1: The Latino Paradox

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9.9.2: Becoming American- episode of Unnatural Causes

I'mthinking about removing this video from the curriculum and instead using newer sources exmaining the Latino paradox or Immigrant paradox. Make sure to note that it is not uniform -- it does seem to apply to life expectancy and general measures like self-reported health or any cause of morbidity -- but when you look at specific conditions, it doesn't always hold. Does seem to hold for Latinx including undocumented for depression, for example.

Here is one possible recent source - could assign or summarize -- https://www.statnews.com/2023/09/14/...ancy-research/ -- except it's not a free article needs sign in to STAT. link through library?

Short piece from Becoming American defining the paradox (but a clip not rounded): https://youtu.be/wdnd9U9o0dI?si=4OAS0iD8Slp9QJ3Q

From Borell in this presentation (https://youtu.be/PzFsGBeTuGk?si=mDjpijA8GOFC-e1K) there's emphasis on the fact that the data still -- current to early 2020's -- show the Latino paradox persisting in birth outcomes and longevity. However, the Latino population is quite diverse and when you look at subpopulations (e.g., Puerto Rican moms in NYC whose birth outcomes are closer to those of African Americans) the paradox doesn't always hold. Important to note that the Latino population is much larger now than in the past (when the paradox was first noted in the Southwest) and also more diverse -- more different countries, indigeneity, refugees and asylees with a different experience -- and the growth in the population overall is more from births in the US than from immigration. So also acculturation plays a role -- less protective factors over time. At the same time, increased xenophobia and anti-immigrant feeling and actions negatively affect health. She mentioned (but didn't show) a documented effect of sanctuary cities in improving childhood asthma and reducing emergency room visits -- wow. That sanctuary is being ruptured violently. Talk about Los Angeles in this section.

Borell also notes that what Latino population wants to be called -- Hispanic is most preferred, then Latino, with a smaller group using Latinx and Latine. The chart she used maybe?

In the Unnatural Causes series, there is a 30-minute segment on the Latino Paradox and immigrant health. "Becoming American." Please watch this as an important video supplement to this week (required):

Becoming American

This video is now viewable in CANVAS. You can go back to the Module and find it there.

Consider this statement from the Study Guide for this episode:

The Mystery: Why do recent Mexican immigrants to the United States, though typically poorer, have better health than the average American? What conditions in America erode their health advantages over time?

Themes:

1. There is an "immigrant paradox" when it comes to health: Recent new immigrants have, on average, better health than native-born Americans, even when though they are poorer.
2. After living in the U.S. five years or more, their health outcomes become markedly worse, especially those of the next generation.
3. Economic mobility and health are intertwined.
4. Strong social networks and hopefulness may promote better health, not only in immigrant communities but for all of us.

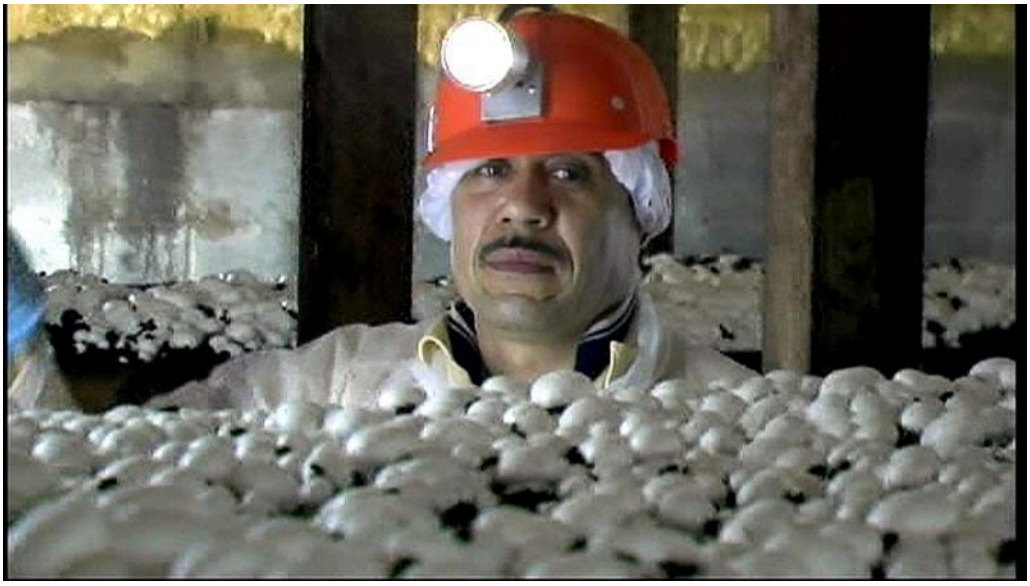
Think about these Study Guide questions from California Newsreel, the producers of *Unnatural Causes*:

- According to the film, Latino immigrants who have lived here five years or more are one and half times more likely to have high blood pressure than when they first arrived. What are other examples from the film of how heath outcomes get worse, not better, over time?

- Public health official Dr. Tony Iton says of immigrant health, "They're doing something right." What conditions in the Bernals' lives protect or promote their health? What do these conditions protect them from? What might cause their health to decline over time?

- Describe the role that each of the following might play in eroding the family and social supports that help keep immigrants healthy:
  - • Poverty
  - • Discrimination
  - • Low-paying jobs
  - • Ineffective schools
  - • Substandard housing

- The film notes that workers at the mushroom farm get no paid sick days and that the U.S. is alone among wealthy nations in not legislating paid sick leave. In your view, what are the consequences for working families in America of not having paid sick days? How would families benefit if these were guaranteed by law for everyone?
- According to the film, three out of four Americans who were at the bottom of the income ladder in the late 1980s were still there a decade later. What conditions limit economic mobility? How do current U.S. economic and labor policies "stack the deck" for or against working families?
- In describing neglected neighborhoods, Dr. Iton says that if your "environment is giving you cues that you're not valuable, that you have little prospects for a good future, that starts to build up and you internalize that devaluation." What specific things about a neighborhood can make one feel valued or devalued? How might resources be allocated so that people from every neighborhood in your city or town can feel valued?
- The film reports that social isolation is on the rise in the U.S. What are the causes of social isolation? What efforts or opportunities exist in your community to decrease social isolation and provide members with a sense of belonging and connection? What might be done to strengthen, sustain, or expand those efforts?



Unnatural Causes - Becoming American picture of Bernal at work

Photo source: Unnatural Causes website press packet

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9.10: African Americans- Health overview and leading causes of death


Credit: Knight Foundation event -- bookfair and children

In 2014, Americans who have origins in any of the black racial groups from Africa made up 14.3 percent of the US population, the second largest minority group in the nation. While African Americans live in all parts of the US, over 50% live in the southern states. About 20% have a Bachelor's degree or higher level of education, and about 85% have completed high school. Still, African Americans have a higher than average rate of not obtaining a high school diploma, and they have the lowest median household income of all ethnic or racial groups (see Figure 10.5 on p. 261).

As with each of the health profiles, the textbook highlights some **cultural factors**, including ones that might make African Americans reluctant to access conventional health services. Some of these date back to slavery. The Tuskegee Experiment which is briefly mentioned was a shameful moment in US history and public health practice (and it has recently come out that similar experiments were run in Guatemala by US public health officials, and other places too). Public Health officials denied treatment to Black men with syphilis in order to investigate the natural course of the disease, without their knowledge or consent. This was not the only unethical public health study, but it is one that has cast a long shadow and sowed deep distrust in the African American community regarding the health establishment.

Other cultural factors include strong relationships with extended family, food traditions, a high rate of participation in faith communities, and other characteristics that can interact with health.

Leading causes of death -- see ICPH, Table 10.5

1. Heart disease
2. Cancer
3. Stroke
4. Unintentional injuries
5. Diabetes
6. Chronic lower respiratory diseases (lung diseases)
7. Kidney diseases
8. Homicide
9. Sepsis
10. Alzheimer's disease

Photo Source: Knight Foundation, Detroit via Flickr

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9.11: Asian Americans and Pacific Islanders- Health overview and leading causes of death

Asian Americans refer to those who trace their ancestry to more than 20 different Asian countries. Asia is home to more than half of the world's population, so this is a very diverse group of people. In 2023, Asian Americans and Asian immigrants accounted for about 7% of the US population, and were the fastest growing segment of the population, especially in the western United States. This group is highly diverse socioeconomically, and immigration plays a large role in this community.



Asian Law Caucus at May Day protest 2017; photo from Wikimedia Commons.

This overview from Pew Research offers a snapshot of the Asian American population today.

High school graduation rates are high, yet conceal significant differences in educational attainment among Asian Americans, both by country of origin and socioeconomic class. For some Asian groups, for example, the Taiwanese, almost everyone graduates high school and a high percentage graduate college. For other groups, like the Hmong, less than 2/3 graduate high school (Seabert, McKenzie, & Pinger, 2022).

In describing **cultural beliefs** related to health, the textbook highlights the general idea of balance or equilibrium that is important in many Asian cultures. Traditional healing methods may encourage re-establishing balance, and may treat the patient holistically, not only addressing physical health.

A focus on collective identity alongside individual identity has also been noted as influencing health behaviors -- for example, Asian populations both in Asian and in the US were the first to adopt mask-wearing in the Covid-19 pandemic. This could be due in part to a cultural sense of collective responsibility. It could also simply be a result of having experienced first-hand the 2003 SARS outbreak and the MERS outbreak in Korea in 2015, so the risk of a new coronavirus was more obvious and the practice of wearing masks was more familiar. Asians were also heavily targeted during the covid pandemic, both in political rhetoric (from President Trump on down) and in actual hate crimes against Asians, who were unfairly and inaccurately blamed for the virus (Pew, 2023).

There are considerable differences in cultural practices around health among different Asian groups. Asia is a large and highly diverse region!

Changes in Data Collection: Until 2010, information on Pacific Islanders, including Native Hawaiians, was combined with data on Asian Americans, which made it difficult to research the specific needs of Pacific Islanders. Many Native Hawaiians, for example, live in rural Hawaii, not close to the central health infrastructure of Honolulu. Pacific Islanders in California who may trace their roots to Samoa, Guam, Tonga, Fiji, Hawaii, the Marshall Islands or many other island nations, face considerable barriers

to healthcare, including living in low socioeconomic community often and the fact that many services are not culturally sensitive or aware.

Leading causes of death -- year

1. Cancer
2. Heart diseases
3. Stroke
4. Unintentional injuries
5. Diabetes
6. Influenza and pneumonia
7. Chronic lower respiratory diseases (lung diseases)
8. Alzheimer's disease
9. Kidney diseases
10. Suicide

Asian Americans are the only major ethnic/racial group in the US to experience more deaths from cancer than from heart diseases -- largely due to lower rates of heart diseae, not higher rates of cancer, although that can vary for some specific forms of cancer that are more prevalent among certain Asian ethnicities.

Hidden Barriers to Healthcare for Asian Americans and Asian Immigrants

The 2021 documentary from PBS, Hidden Barriers, shows some of the experiences of Asian Americans and Asian immigrant residents in accessing healthcare. These two short episodes -- about 7 minutes each -- are a great place to start.

Interactive Content

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this Interactive Content online

Interactive Content

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this Interactive Content online

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9.12: American Indians and Alaska Natives- Health overview and leading causes of death

American Indians (also called Native Americans and in Canada, First Nations) and Alaskan Natives are the population that has the deepest roots in this continent. They are the original inhabitants of America, and represent many different tribes, languages, customs and cultures.



Child dancing at Riverside CA Powwow 2014

This group represents less than 2% of the US population currently.

The U.S. Government has a unique relationship with the provision of health care to Native Americans, both because some tribes are sovereign nations with treaty rights recognized (even if inconsistently) under the US Constitution, and because of the role of the Indian Health Service. The Indian Health Service serves 566 federally-recognized Native American and Alaska Native tribes, with clinics, hopsitals and other programs, in urban centers, on reservations and in Alaskan villages. Today, many programs are operated directly by individual tribes under contract to the Indian Health Service.

Tribes also run their own community health outreach programs, radio programs, and other resources that promote health both on reservations and among urban Indians.

Leading Causes of Death -- see ICPH, Table 10.7

1. Heart diseases
2. Cancer
3. Unintentional injuries
4. Diabetes
5. Liver diseases
6. Chronic lower respiratory diseases (lung diseases)
7. Stroke
8. Suicide
9. Influenza and pneumonia
10. Kidney diseases

Photo Source: Daniel Orth (2014), on Flickr

OPTIONAL: 6-minute video about the Native American Health Center, now about 50 years old, an institution that is vital to the health (and voice) of Native Americans in the Bay Area.



https://www.youtube.com/watch?v=tpRQZp7X8gE

https://www.youtube.com/watch?v=tpRQZp7X8gE

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9.13: Immigrant and Refugee Health

after arriving in a new country. **Refugees cannot return home due to a well-founded fear of persecution for reasons of race, religion, nationality, political opinion, or membership in a particular social group.** Under international law, the United States is obligated to provide refuge to legitimate refuge, just as we would want our citizens to be accepted into refuge elsewhere should our country erupt into civil war. War and civil conflict are the leading causes of refugees feeling their countries. There are sometimes temporary flows of refugees due to natural disasters or climate disasters. Refugees have generally experienced high levels of trauma, and may also present with other health issues or injuries due to the situations they have fled.



Protest in favor of immigrant rights, San Francisco, 2017

The world is experiencing a severe refugee crisis, with an estimated 19.5 million refugees around the globe in 2014. That is not including the people who are "internally displaced," refugees within their own countries, nor even including asylum seekers, who are like refugees but who apply for legal refuge

Asylees (those who receive asylum) also have a well-founded fear of persecution that makes it impossible to return to their home country. Asylees are granted asylum by an immigration court, where they have appealed for asylum after arriving in the U.S. (or other country of refuge).

Immigrants are those who migrate from one country to another seeking permanent or long-term residence and hopefully a better life. Figure 10.9 shows the main sources of immigration to the US in two time periods -- 1960 and 2013. It is much more diverse group of refugees arriving in the US now than in 1960. The total numbers has also risen -- and 21st century immigration is almost as high as early 20th century immigration was, as a percent of the total population (14.7% in 1910). In 2013, immigrants made up about 13% of the US population.

While immigrants and refugees are also members of the racial and ethnic classifications recognized in the US, they have specific health concerns due to their circumstances as refugees or immigrants. While immigrants tend to be healthier than their US-born peers, refugees often arrive with serious health problems such as undernourishment, trauma, or diseases of poverty like parasites. There are organizations dedicated to helping refugees resettle in the US and integrate into life here.

Refugee programs were severely cut back under the Trump Administration and are expected to expand under the Biden Administration. Support for refugees has not always been a partisan issue -- and in fact even now, regardless of political affiliation, those who have direct contact with refugees or refugee support organizations are most likely to support expanding refugee programs in the US, and most Americans, regardless of party, support the ideal of the US as a safe harbor for those in dire need. For more information on US attitudes about immigrants and refugees, you can visit the Pew Trust (OPTIONAL).



Photo Source: Pax Ahimsa Gethen, on Flickr

Health of Diverse Ethnic/Racial Groups in the US

Based on Chapter 10 and the brief summaries for the ethnic and racial groups above, what **differences** among ethnic/racial groups strike you as important for public health efforts? What **similarities** do you notice?

If you were starting to work in a new community, how would you want to learn about the **cultural health beliefs and practices** of the residents? How about their economic, political, educational and social **status**? What more would you want to know, to understand the community you serve better?

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9.14: Minority Health and Health Inequities (disparities)

Closing the gap on health is a priority for public health in the US. You already know it is a Healthy People goal for the nation. It is also a fundamental element of a successful democracy. Dr. Martin Luther King, Jr. once said, ""Of all the forms of inequality, injustice in health is the most shocking and inhumane."

On pages 269 to 276, the authors of the ICPH textbook discuss a number of important health disparities or inequities. Some of these we have seen in other modules, while others were barely touched on in previous modules. As your textbook says on pp. 269-270, "The research literature suggests racial and ethnic minorities experience poorer health status, have lower levels of insurance coverage, and have inadequte access to health care services." This is an inequity that can and should be overcome.

Health Disparities Definition

Health disparities are differences in the incidence, prevalence, mortality, and burden of diseases and other adverse health conditions that exist among specific population groups in the United States.

The term "heatlh inequity" emphasizes the "equity" aspect -- the fact that many health disparitties are avoidable and unfair.

For most purposes, **the terms "health disparities," "health inequities" and "health inequalities" can be used interchangeably.**

Excess mortality is a measure often used in measuring health inequity. Excess mortality refers to the number of deaths from all causes that is higher than "normal" -- whether comparing populations (e.g., Black Americans have excess mortality compared to the average mortality rate of all Americans) or the impact of a crisis (e.g., excess mortality of Covid-19 could be measured by comparing deaths from all causes in 2020 to those in 2019 or 2018).

Some history

In 2002, the US Institute of Medicine released one of the first important reports dealing with health disparities: Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care. This report revealed disparities in **access to care** and in **quality of care**, and also pointed to what we now often call unconscious or **implicit bias**. It was a "wake up call" to many who preferred not to look at the inequities in our system, and spurred "calls to action" to do something about it. The report also set out a blueprint for how to address disparities, work that was expanded on in later reports from other public health agencies.

Here are just a few of the national initiatives to overcome health disparites:

- Racial and Ethnic Approaches to Community Health (REACH)
- Communities Putting Prevention to Work (CPPW)
- HHS Strategic Action Plan to End the Tobacco Epidemic
- Efforts to Reduce Disparities in Influenza Vaccination
- HHS Action Plan to Reduce Racial and Ethnic Health Disparities

All the way back in 1985, before some students in this course were born, the Department of Health and Human Services (HHS) released the landmark **1985 *Secretary's Task Force Report on Black and Minority Health***, a report remembered today mainly for raising awareness in public health and public policy circles about the severity of health disparities. The report identifed 5 causes of death that accounted for than 80% of the excess mortality observed among Black Americans and other groups. This later tied in to setting goals for closing those gaps in Healthy People 2010 and Healthy People 2020.

In 1997, then-President Bill Clinton launched The President's Initiative on Race, to end health disparities by 2010. Obviously, that goal was not met -- and some actions of the Clinton Administration actually increased health inequities (for example, a crime bill that rapidly increased incarceration rates). **However, in supporting public health actions on six key priorities, the Race and Health Initiative that started under the Clinton Administration has persisted and had some positive effects.** These goals are now a part of Healthy People 2030, and therefore of many other health plans aimed at preventing disease, promoting health

and delivering care.

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9.15: Health Disparities in Specific Health Conditions

Please take a closer look at 1 or more of the following specific health issues in this section.

These are the six prioirty areas identified in the Race and Health Inititative at the federal level, "emphasizing the six health issues that account for a substantial burden of disease that is highly modifiable if appropriate interventions are applied."

- **Infant mortality**
- **Cancer screening and management**
- **Cardiovsacular diseases**
- **Diabetes**
- **HIV / AIDS**
- **Child and adult immunization rates**

6 ig health issues:

- substantial burden of disease (causes a lot of illness and death)
- highly modifiable (changeable) if appropriate action is taken

All of these are also priorities in Healthy People 2020 and Healthy People 2030, and most local or state health departments have programs to address these areas. These areas are not described much in this Lesson -- please take the time to review what is happening in health disparities in at least 1 or 2 of these 6 issues.

***Questions for Reflection*:**

- What do you notice about the disparities for these issues?
- Do any of these intersect with what you wrote about for the Social Determinants of Health paper?
- Where do you see advances in closing the gaps, and where not?
- How might you use information about health disparities if you were working in community health?

Another thing to keep in mind:

Some types of disparities are easier to fix than others

- Disparities in influenza, for example, have decreased hugely as immunization has increased. There are still disparities in rates of immunization -- but immunization is a fairly quick event, something that can be addressed in a short time if effective methods to reach underserved groups are found.
- Cancer, on the hand, develops over time, through multiple causes and exposures. While we can reduce the disparities in cancer screening and management through high quality public health and medical programs, it will be harder to reduce the disparities in the onset of cancer.

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9.16: Social Determinants of Health and Racial and Ethnic Disparities in Health

On pp. 276-279, the authors of the textbook give a good introduction to social determinants of health. This should be familiar to you, from our Module on Social Determinants of Health. The diagram in Figure 10.18 shows some of the relationships between social conditions and health. I like this diagram a lot and hope that by now in the class, and with the support of Chapter 10, you could easily explain this diagram if someone asked you to.

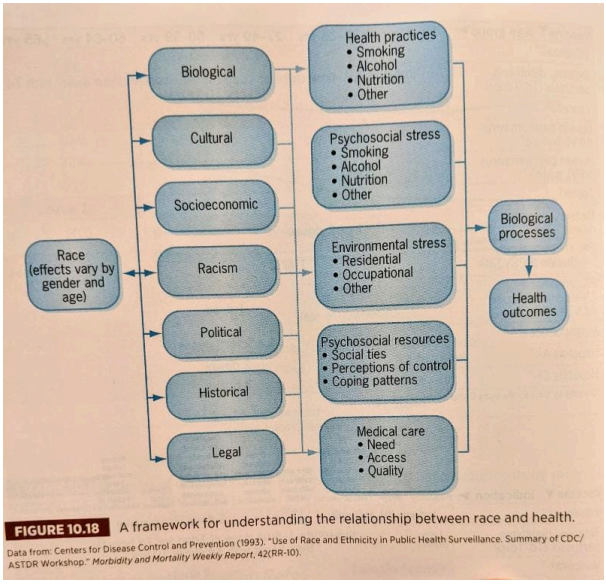


FIGURE 10.18 A framework for understanding the relationship between race and health.

Data from: Centers for Disease Control and Prevention (1993). "Use of Race and Ethnicity in Public Health Surveillance. Summary of CDC/ ASTDR Workshop." *Morbidity and Mortality Weekly Report*, 42(RR-10).

Race, Ethnicity, Education and Income

The connection between racial/ethnic group, educational level and income is shown in Table 10.8 in your textbook.

- One of the ways that higher education supports better health is by leading to **better jobs** with more income and better benefits.
- Another way is through expanding **social capital** or social connection.
- Yet another is through developing the abiity to locate, understand and use **health information** better.
- And the last way is through a more internal or psychological shift -- people with more education tend to have a stronger sense of **self-efficacy and optimism**. (RWJF)

2. How does education influence health?

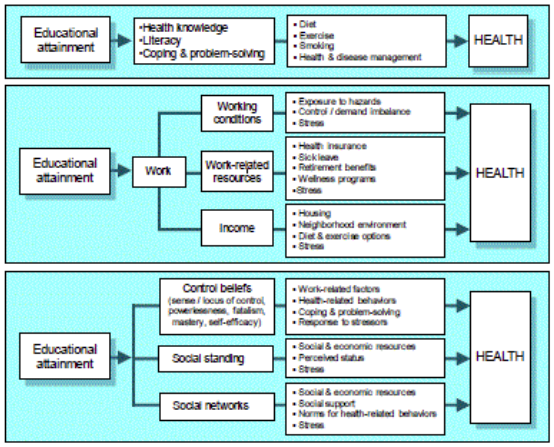


Figure 6. Education could affect health through many different pathways.

Researchers have found supporting evidence for each of the following interrelated pathways (Figure 6):

RWJF How does education influence health

What you are doing RIGHT NOW by attending City College is actually good for your health!

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9.17: And now... cultural competence and cultural humility

The remainder of this lesson focuses in on the idea of **cultural competence** (or competency), **cultural humility** (a related but distinct concept), and **some tools for putting cultural competency and cultural humility into practice**.

plus Covid-19

I've also added a little information about Covid-19 and this pandemic year, and how that has affected diverse racial and ethnic populations in the US.

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9.18: Cultural Competency

There are many definitions of cultural competency in current usage.

One definition used by the U.S. Department of Health and Human Services, Health Resources and Services Administration, Bureau of Primary Health Care is fairly brief (compared to some) and to the point:

Cultural and linguistic competence is a set of congruent behaviors, attitudes and policies that come together in a system, agency or among professionals that enables effective work in cross-cultural situations. "Culture" refers to integrated patterns of human behavior that include the language, thoughts, communications, actions, customs, beliefs, values, and institutions of racial, ethnic, religious or social groups. "Competence" implies having the capacity to function effectively as an individual and an organization within the context of the cultural beliefs, behaviors and needs presented by consumers and their communities.

The American Association for Health Education defines cultural competency with a slightly different emphasis:;

Cultural competence is the ability of an individual to understand and respect values, attitudes, beliefs, and mores that differ across cultures, and to consider and respond appropriately to these differences in planning, implementing, and evaluating health education and promotion programs and interventions.

These and other definitions arose in the last 30-40 years as healthcare systems and providers realized they needed to respond to the increasingly diverse populations they served, and that the process of becoming more culturally competent would take time and effort. That is, it is a*process*.

- Some researchers/practitioners focused on *stages* that an organization would need to pass through on the way to becoming culturally competent (e.g., Terry Cross, an influential researcher into cultural competency).
- Others focus more on a *continuum of approaches,* each of which may have its role in healthcare, depending on the circumstances and needs.

Both ways of looking at cultural competence challenge healthcare providers and systems to **change themselves** – not just focus on changing patient behavior – so that better health outcomes are possible.

Optional: See more definitions of cultural and linguistic competency at this link from the National Center for Cultural Competency

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9.19: Cultural Humility

Dr. Melanie Tervalon, with Dr. Jann Murray-Garcia and other colleagues, has offered an alternative approach, what she calls **Cultural Humility**.

She has criticized the idea that anyone can become "competent" in a culture not their own. She challenges the trend within medical education, in particular, that fosters the idea of doctor omniscience and expertise. It's hard enough (maybe impossible) to know all one should know medically. It's ridiculous to also presume that in a short period of time, a medical resident can become culturally "competent," an expert in all the cultural variety in our world. In place of "cultural competency," she posits the idea of "cultural humility." The word "humility" comes from "humble" - like, not holding yourself above others. "Cultural humility" does *not*mean feeling humiliated - it means recognizing your limitations and keeping open to the full humanity of the person in front of you.

Cultural humility is defined as a:

. . . process that requires humility as individuals continually engage in self-reflection and self-critique as lifelong learners and reflective practitioners, it requires humility in how physicians bring into check the power imbalances that exist in the dynamics of physician-patient communication by using patient-focused interviewing and care, and it is a process that requires humility to develop and maintain mutually respectful and dynamic partnerships with communities.

From Tervalon M, Murray-Garcia J. Cultural humility versus cultural competence: a critical distinction in defining physician training outcomes in multicultural education. J Health Care Poor Underserved 1998; 9(2):17-25.Cited in Bridging the Gap: A Curriculum to Teach Residents Cultural Humility, by Jennifer Anderson Juarez, MEd; Kim Marvel, PhD; Kristen L. Brezinski, MS; Cherie Glazner, MD; Michael M. Towbin, MD; Susan Lawton, MD. Fam Med 2006;38(2):97-102.

Take a moment to view these first 7 minutes of a 30 minute video about cultural humility (produced by Dr. Vivian Chavez of SF State). In this video, pay attention to the 3 or 4 components of cultural humility that are emphasized:

- **Lifelong learning and critical self-reflection**
- **Recognize and change (or challenge) power imbalances**
- **Patient-centered interviewing and care**
- **Institutional accountability to communities**



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9.20: Cultural Barriers to Care

The conventional medical view of culture and health used to be that the client's culture creates a "barrier" to "complying" with medical care. For example, if the doctor prescribes a medicine that must be taken every day, but the patient's family emphasizes prayer and herbs instead of a medicine they believe may hurt the patient, then the doctor sees the patient's culture as a "barrier" to care. More recently, many researchers have begun to turn this idea upside down, and instead ask, **what is it about our medical culture, our clinics and our services, that creates a barrier for patients?**

The culture of bio-medicine IS a culture, after all - and like every culture, when you are inside of it, it shapes how you see the world. It has its blind spots.

- Some barriers have to do with the providers themselves (doctors and nurses).
  - For example, a provider might assume that the best way to get information is through direct questions, or having the client fill out a form. (That might clash with some patients' way of doing things.)
  - A provider might assume that the patient understands how medicine works, or how germs cause disease.

- Other barriers have to do with the clinic system, the hospital procedures, or insurance practices.
  - For example, a hospital might say "Only family members may visit the patient" - but who gets to define "family"?
  - The definition varies among cultures, and sometiems across generations within a single culture. (Do you think the same way about family as your grandparents do or did?)

OPTIONAL video: This short clip (3 minutes) from the producers of Unnatural Causes reports the views of a Native American leader and doctor, Dr. Donald Warne, discussing cultural considerations and access to medical care.

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9.21: Culturally and Linguistically Appropriate Services (CLAS) Standards

Please see page 281 in ICPH for the CLAS Standards that guide the delivery of public health and health care services.

The principal standard is to "Provide effective, equitable, understandable, and respectful quality care and services that are responsive to diverse cultural health beliefs and practices, preferred languages, health literacy, and other communication needs."

To do this requires changes to governance, leadership and workforce; to communication and language assistance, and to engagement, continuous improvement and accountability.

Optional Video on the CLAS Standards:

:



Fundamentals of the National CLAS Standards

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9.22: Health Inequities in the Pandemic

You may have heard people say that this virus does not discriminate. And on one level, certainly that's true -- Hollywood actors and poor fish merchants have been infected alike. People of all ages have died from this disease. People of all races or ethnicities. Anyone CAN get sick.

But not everyone DOES get sick. Some populations -- older adults, people with chronic conditions, African Americans, Latinx, Pacific Islanders, and Native Americans, men more than women -- have been more likely to fall ill with Covid-19 or more likely to die of it if they do get sick.

What factors that we have discussed elsewhere in this Module might contribute to the health inequities in Covid-19?

There are many news stories, videos, commentaries and more on this topic -- I got a little overwhelmed myself, reviewing what to share with you in this Lesson!

Take a moment to explore this 3-minute video about health disparities and covid from the CDC:



Inequities in the Pandemic aren't all about Covid

2020 was a devastating year for many reasons, and not only due to Covid-19 itself -- and while the strictest shut-downs ended fairly quickly, many schools didn't open until 2021 or even 2022 -- and in many ways, our economy and our health system are still adjusting to the aftermath of the worst phase of the pandemic. Covid continues in an endemic way now in 2023 and moving into 2024, still taking lives of older adults and many people with chronic conditions.

2020 also saw an uprising of hope and rage in response to the deaths of George Floyd, Breona Taylor, and many others -- we are still grappling with the need for greater racial equity in policing, in the economy, in our society as a whole.

And we are seeing a political backlash against both the covid-related public health measures and the movement for racial justice, as well as a strong anti-LGBTQ backlash, that have added to the distrust, inequities, and violence in this country.

Here are some of the struggles that influenced health inequities in 2020 -- which do you still see continuing now? In what ways? With what effects?

- Social isolation
- Job loss and income loss
- Housing insecurity
- Small businesses affected
- School shut downs
- Lack of access to primary care clinics
- Mental health strains
- Opioid epidemic increasing
- Racialized threats and hate crimes
- Racialized police violence
- The hope and rage in last summer's major mobilizations against racism
- The slow rate of change by institutions to address that racism

What more might you add to this list?

And -- because RESILIENCE is important to lift up, too -- what habits, relationships, behaviors did you adopt during the pandemic that have been HELPFUL to you, your family, or your community? What social movements were strengthened in the last few years, and how might that help to reduce health inequities in the long run?

Immigrant and Refugee Communities

In terms of global health, this is a global pandemic. Many immigrants and refugees living in the US have family members back in their countries of origin affected by the disease. You can imagine the worry and distress this can cause.

The pandemic also has had dire effects on refugees around the world. As borders shut down to stop the spread of disease, many people seeking to flee persecution or other intolerable situations were no longer able to enter another country for safety. In addition, refugees in crowded refugee camps or camps for displaced persons (internal refugees) have been at terrible risk of disease -- Covid-19 and other communicable diseases, too.

Differential impacts

There are many ways that the COVID-19 pandemic may affect different communities differently.

Here are just a few to consider:

- For Native American and Alaskan Native tribes that are small in number, there are concerns that this disease is causing a new genocide. Many elders have died -- elders who were the native speakers of languages and the holders of tradition and history.
- People of color are more likely than whites to have a "front-line" job that requires them to still go to work -- as bus drivers, line cooks, hospital staff, and more. More whites have the type of job that can be completed from home. That has meant that people of color are more likely to be exposed to Covid-19 and to become ill, get hospitalized, and even die from the disease.
- At the same time, people of color have also experienced high rates of unemployment -- as entire industries have largely shut down (tourism and entertainment, for example). They are less likely to have enough savings to weather the crisis.
- For the many non-English-speaking populations, the chance that they may face hospitalization without any access to language interpreters is increased during a time of such stress in our healthcare systems.
- Social distancing and isolation aren't easy for anyone. But for cultures that emphasize interdependence and mutual support, it is even harder.
- Discrimination and hate crimes against Chinese Americans and other Asians have risen since the pandemic began, and police violence against African Americans and Latinx communities has come to the fore.
- What types of impacts are you most worried about?

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9.23: What does a successful response look like?

Take a moment to review at least ONE of the resources below. Each of them shows a successful way of working to reduce Covid-19 in racial or ethnic communities that have been hard-hit by the pandemic. Each of them gives me some hope that together we CAN address the health inequities that exist -- and save lives.

Native Americans - getting the vaccine out effectively - NPR story

In African American Communities, Black Doctors are Changing Minds About Vaccination - NY Times story

And on a related theme: podcast from the United States of Anxiety about concerns about vaccination in the African American community

San Francisco's Mission District has been a Covid hotspot, especially for the Latino/a/x community. The United in Health (Unidos en Salud) campaign has been super effective at reaching people with testing (and now with vaccines), and helping those who test positive to quarantine with help for food and money -- because everyone has a "right to recover." United in Health main site

Chinatown in San Francisco - well prepared for Covid - article in the NY Times

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9.24: Additional Resources

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10: MATERNAL INFANT AND CHILD HEALTH

10.1: Learning Outcomes

10.2: MIC Indicators of Population Health

10.3: Social and Behavioral Factors in Maternal and Infant Health

10.4: Genetic Factors in Maternal and Infant Health

10.4.1: Genetic Disorders and the Ethics of Prenatal Testing

10.4.2: Epigenetics

10.5: Age and Pregnancy

10.6: Family Planning / Contraception

10.7: Abortion

10.8: Maternal Health

10.8.1: Maternal Mortality

10.8.2: Crisis in Maternal Mortality - video

10.8.3: Life Course Perspective

10.8.4: California- A Partial Success Story in Saving Mothers' Lives

10.9: Infant Health

10.9.1: Infant Mortality

10.9.2: Immunizations in Infancy and Childhood

10.10: Childhood Health

10.10.1: Leading Causes of Morbidity and Mortality

10.10.2: Health Concerns for Children

10.11: Public Health Programs for MICH

10.11.1: Social Ecological Model to Reduce LBW and Preterm Birth

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10.1: Learning Outcomes

Maternal, Infant and Child Health is one of the oldest disciplines within public health. The unnecessary and preventable death of babies and of mothers (or to use a broader, more inclusive term, birthing parents) is a deeply-felt health concern; actions taken to improve the health of birthing parents and babies have a ripple effect through the whole population. For that reason, infant mortality is one of the best indicators of how healthy a country or population is, overall.

This area of public health is often abbreviated MIC (Maternal, Infant, and Child), or MICH (Maternal, Infant, and Child Health) or MCH (Maternal and Child Health). While not all people who give birth consider themselves to be mothers, in this chapter, the term "maternal" will generally be used to refer to birthing parents.



By the conclusion of this module, you will be able to

1. Define maternal, infant and child health
2. Explain the importance of maternal, infant and child health as indicators of society's health
3. Define family planning and discuss its importance, as well as government programs and policies that affect access to contraception.
4. Discuss genetic, social and behavioral factors that influence the health of infants, children, and birth parents.
5. Define abortion and discuss legal decisions that increase or decrease access to safe and legal abortion.
6. Define maternal mortality rate and identify some factors that influence both the rate of maternal mortality overall and the racial inequities in rates.
7. List major factors that contribute to infant health and to infant mortality.
8. Identify important governmental programs developed to improve maternal and child health.
9. Identify the leading causes of childhood morbidity (illness/injury) and mortality (death), including immunizations, health insurance, and injury prevention.

Inclusion of All Genders in MIC

Transgender and nonbinary people's reproductive healthcare needs may not be met by traditional approaches to "maternal health." Contraception, pre-conception, pregnancy and perinatal care are needed by many people whose gender does not fall within the traditional binary of women's health or men's health.

Gender (meaning both one's gender identity and our social conceptions of masculinity and femininity) and biological **sex** both play a role in reproductive health care, and public health workers and medical providers must be aware of that. Moving beyond assumptions and providing culturally appropriate care to all is key to overcoming health inequities.

For healthcare providers, this can include getting additional training on the needs of pregnant and parenting trans people,

respecting patient choices on names and pronouns, and learning more about how hormonal treatments for gender reassignment may or may not interact with hormonal methods of birth control or hormonal changes during pregnancy. Advocacy groups are raising awareness of these concerns, and medical providers are also expanding knowledge of research and practice in MIC for transgender populations.

A Womb of Their Own is a documentary about trans masculine queer pregnancy and parenting that may interest some of you. Here is the trailer:

YouTube Video

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this YouTube Video online

Gender Expectations and MICH

Gender (different from biological sex) refers to both personal and societal expectations of what it means to be a man or a woman. Fertility, pregnancy, birth and parenting are all markers of gender, in most societies. Societal ideas of gender affect everyone -- not only nonbinary and trans people, but also cis men and cis women, especially if they do not conform to some aspect of the prescribed gender role. (Cis women = women whose biological sex and felt sense of gender are aligned.) Among cis women who choose not to have children, or who cannot conceive, or whose pregnancies do not go as planned, sometimes they experience an impact on their sense of themselves as women or in how others see and treat them. Likewise, for some parents of any gender, the experience of having a child may affect in important ways (positive, negative, or otherwise) their sense of *living their gender* -- being a man, a woman, or another identity. For people working in the area of MICH, it is important to be sensitive to how gender expectations and gender identities play a part in one's health and decision making. In public health, we seek to affirm the many valid and healthy ways to live one's life and to form (or not form) a family, whatever one's gender may be.

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10.2: MIC Indicators of Population Health

MIC is an excellent indicator of the effectiveness of disease prevention and health promotion services in a community, overall. A healthy community will tend to have healthy moms and healthy babies. Good health in early childhood increases the likelihood of a healthy adolescence and adulthood. This is true not only on the community level, but also when comparing nations. MIC mortality rates are important measures of a nation's health. MIC mortality rates include maternal mortality, infant mortality and child mortality.

Global Health Indicators

Infant and child mortality rates have decreased hugely in the past 20 years, as have maternal mortality rates in most countries.



In global health, this decrease in infant and child mortality rates has had an enormous effect on life expectancy in poor countries --- not to mention quality of life.

Internationally, rates of infant mortality have been declining for some time. In 1990,total under-5 deaths worldwide was 12.6 million, while in 2020, there were approximately 5 million deaths (half of whom where newborns), a drop of about 60%, according to the World Health Organization (WHO).

One of the many tragedies of the Covid-19 pandemic is how many gains in MIC health have been pushed backwards, as medical resources were diverted to treat covid patients, and vaccinations and routine well-baby visits were postponed.

ADD IN global maternal mortality indicators and child mortality rates

US Health Indicators

In the US also, we have seen significant improvements in maternal, infant and child health in recent decades. However, while child mortality and infant mortality have dropped in the US, maternal mortality has increased -- as have the health inequities related to maternal mortality.

Infant Mortality

Overall, the rate of infant mortality in the US has declined slightly in recent decades. From 1900 to 2000 (a century), the rate declined a lot -- from approximately 100 infant deaths per 1000 live births, to 6.89 in 2000 (MacDorman & Mathews, 2011). Since the year 2000, declines have been small but important. The CDC reports the following rates for 2022:

Infant mortality overall in 2022: 5.6 deaths per 1,000 live births

Top five causes of infant death:

- Birth defects
- Preterm birth and low birth weight
- Sudden infant death syndrome
- Unintentional injuries, like car crashes
- Maternal pregnancy complications

The rate of infant mortality varies a lot by region, with the South and the Midwest reporting the highest rates. Yet even in states like California where the overall rate is relatively low (under 4.48), significant health disparities remain, with higher rates of infant death in some populations.

Racial inequities in infant mortality are highly notable. Non-Hispanic Black infants die at more than twice the rate of white infants (10.9 vs. 4.5 deaths per 1000 live births). Non-Hispanic Native American and Alaskan Native infants and Non-Hispanic Pacific Islander infants fare almost as poorly, with infant mortality rates of 9.1 and 8.5, respectively. The infant mortality rate among Hispanic babies is close to that for white babies (4.9 vs. 4.5 deaths per 1000), while Asian babies experience the lowest mortality rate (3.5 deaths per 1000 live births).

Incorporate in here: https://www.kff.org/racial-equity-and-health-policy/racial-disparities-in-maternal-and-infant-health-current-status-and-efforts-to-address-them/

CHILD MORTALITY RATES

MATERNAL MORTALITY RATES

Quote from the Maternal Health Tak Force at Harvard University Chan School (c.2015)

The most notable disparity in mortality rates in the U.S. is defined by race:

- Black women die at a rate that ranges from three to four times the rate of their white counterparts—42 deaths per 100,000 live births among black women versus 12 deaths per 100,000 live births among white women as of 2010; this difference in risk has remained unchanged for the past six decades.
- American Indian and Alaskan Native women also fare worse than white women with approximately twice as many pregnancy-related deaths per 100,000 live births.
- Women of color tend to have poorer access to high quality reproductive health information and services than white women, are discriminated against in the healthcare system and experience higher rates of disrespect and abuse.
- Furthermore, there is evidence suggesting that the stress associated with daily experiences of racial discrimination can increase the risk of negative perinatal outcomes including preterm birth and delivery of a low birth weight infant for women of color.
- Maternal mortality ratios also vary significantly by socioeconomic status and geography. Women living in poverty and women in certain states experience significantly higher maternal mortality ratios than the national average.

Later in this chapter we will look more closely at social factors that influence the inequities in MIC health.

Other indicators of maternal and child health as an important marker of population health:

- Death rates for children ages 1 to 4 have declined for all races over the last 30 years, and perhaps most dramatically for Black children (THAT'S GREAT NEWS). Yet, it is still true today that Black children ages 1 to 4 in the US die at about twice the rate of white children. (See Figure 7.4 in ICPH.)
- Hispanics (Latinx) and Asian Americans often report lower mortality rates that are similar to or lower than whites - this may in part reflect the fact that immigrants are generally healthy (or they wouldn't emigrate in the first place). It may also be a reflection of greater social support, differences in diet, or other differences that offset the risks associated with lower average income. Native American and Alaskan Native populations often report rates of infant and maternal mortality somewhere between the rates for whites and Blacks (see Figure 7.4).
- It is worth noting that statistics often erase the important differences among sub-groups in any racial or ethnic category. For example, while Japanese Americans and Laotian Americans might both be classified as Asian Americans, the health

profiles of their communities are quite different. Similarly, the health of African Americans of Caribbean descent, the children of Nigerian immigrants, and African American populations in different regions of the country do experience important differences. And the health of Mexican Americans, Cuban Americans, Salvadoran Americans, and Puerto Ricans (to mention just the four most populous groups of Latinos or Hispanics in the US) can vary widely.
- Geography also plays an important role in health disparities -- rural areas often lack access to family planning and ob/gyn care. As of 2023, nearly 6 million American women or people assigned female at birth live in counties with no birthing facilities. This is a situation that is getting worse, not better, with many rural hospitals closing and many hospitals closing their maternity care units (even if the hospital itself stays open). (source: March of Dimes, 2023)

Citations

MacDorman & Mathews - https://www.cdc.gov/mmwr/preview/mmwrhtml/su6001a9.htm

CDC, cite http://web.archive.org/web/20250826042114/https://www.cdc.gov/maternal-infant-health/infant-mortality/index.html

WHO - add citation

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10.3: Social and Behavioral Factors in Maternal and Infant Health

Health outcomes in MICH are not just the result of biological processes (like conception, pregnancy, and birth). They are hugely influenced by social and behavioral factors. Throughout this chapter, we will examine how some of these factors impact health.

These factors range across the Ecological Model:

Individual or Intrapersonal:

Relationship or Interpersonal:

Community:

Societal:

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10.4: GENETIC FACTORS IN MATERNAL AND INFANT HEALTH

In addition to our parents' genes passing on inherited traits such as eye or hair color, we may also inherit unique health profiles. Genes can be associated with both protective health factors and disease risk factors. Some of these may not even be expressed physiologically until environmental forces - called **epigenetics** - change how the gene is expressed in the body. A few chronic conditions have a single, known, genetic link. Sickle-cell anemia and thalassemia are two such diseases, which are both caused by a mutation on chromosome 11. Interestingly enough, the same mutation that causes sickle-cell anemia may also have a protective effect against malaria infection (Contributors to Wikimedia projects, 2024). Many chronic diseases are thought to have genetic links, from mental illness to cancers or high cholesterol - whether a single gene or multiple genes are involved. For example, the BRCA1 and BRCA2 genes are linked to a high risk of reproductive cancers and breast cancer. In rare cases, obesity can be linked to the variation of a specific gene, called **monogenic** obesity. More commonly though, obesity, cancers, and other chronic diseases that run in families are a combination of multiple factors; including genetics, biology, environment, and behaviors (CDC, 2018).

When it comes to maternal, infant and child health, genetic factors play a role in health outcomes, as well. Some traits run in families -- for example, the tendency to have multiple births (twins or triplets or more) has a genetic component, and births of twins (or more) are higher risk for both the birthing parent and the babies. Some genetic conditions, like cystic fibrosis, elevate the risks associated with both pregnancy and birth for the birthing parent. For infants, genetic genetic or chromosomal abnormalities can also lead to birth defects. When genetic abnormalities are known or suspected to exist in the parents, genetic testing and counseling may be recommended.

References

Centers for Disease Control and Prevention (CDC). (2018). Genomics and obesity. https://blogs.cdc.gov/genomics/2018/...s-and-obesity/

Contributors to Wikipedia (n.d.). Sickle cell disease. https://en.wikipedia.org/wiki/Sickle_cell_disease

10.4.1: Genetic Disorders and the Ethics of Prenatal Testing

10.4.2: Epigenetics

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- 9.3: Genes by Erin Calderone is licensed CC BY 4.0.

10.4.1: Genetic Disorders and the Ethics of Prenatal Testing

Genetic errors are relatively common in the process of conception, and are thought to be the cause of about 50% of known miscarriages (ACOG Committee on Practice Bulletins—Gynecology, 2021). Even if a fertilized egg implants successfully in the uterine wall and continues to grow, genetic mutations can cause a variety of problems. Since each embryo inherits half of their 46 chromosomes (DNA) from each parent, certain diseases can be inherited from only one parent if the genetic disorder is **dominant** - the parent will pass that trait on to approximately half of their offspring. Some examples include Huntington's disease (a brain disease), and certain types of dwarfism (achondroplasia) and gigantism (Marfan syndrome). **Recessive** genes are associated with some diseases that will affect a child if both parents carry them, and if both of those recessive genes are passed on (Schneider, 2020). See Fig. 10.4.1.1 below for the "Punnett Square" diagram illustrating recessive genes.

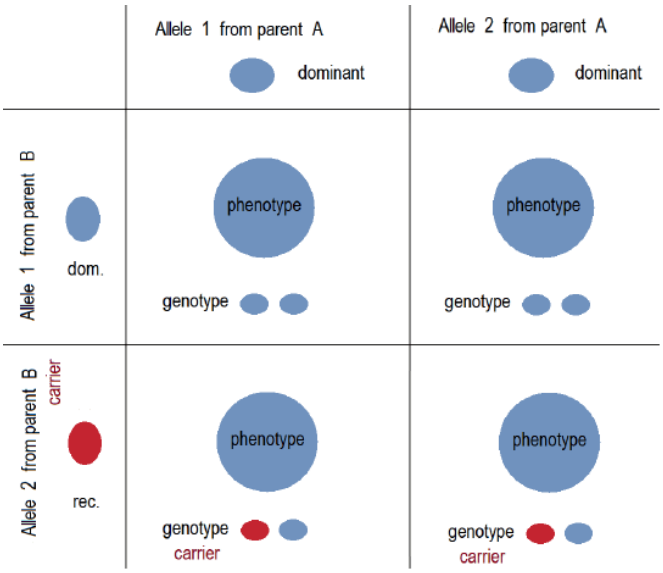


Figure 10.4.1.1: Autosomal recessive inheritance. Punnett square: If the other parent does not have the recessive genetic disposition, it does not appear in the children, but 50% of them become carriers. (Copyright; Sciencia58, CC0, via Wikimedia Commons, 2019)

Examples of diseases associated with recessive genes include:

- Tay-Sachs disease: a neurological disorder, most common in people with Ashkenazi Jewish ancestry;
- Sickle-cell anemia: causes red blood cells to be shaped like a crescent and decreases oxygen transportation, most common in people with African or African American ancestry;
- Cystic fibrosis: a disease of the lungs causing excessive mucus production and damage to lung tissue, most common in people with northern European ancestry;
- Thalassemia: which causes a lack of hemoglobin in the blood, decreasing oxygen transport capacity, affects those with Mediterranean, Middle Eastern, Asian, and African ancestry, (CDC, 2020, National Health Service, 2021, Schneider, 2020).

Still other genetic disorders are linked to the X chromosome or female sex chromosome. These diseases primarily affect genetic males who have XY chromosomes, since the affected X tends to be recessive (whereas in a genetic female with two X chromosomes, the recessive gene would not be expressed) (Schneider, 2020). For example, Duchenne muscular dystrophy is an X-linked disorder that leads to muscular degeneration, weakness, and eventually paralysis. It is not more common in any racial or ethnic populations, but much more common in genetic males than females (Muscular Dystrophy Association, 2017).

Some genetic disorders are not necessarily inherited but occur due to a genetic mishap in either the sperm, egg, or both prior to conception. The human gametes (egg and sperm) each contain one half of 23 pairs of chromosomes, and the resulting zygote (fertilized egg) will have 46 chromosomes, or 23 pairs. A **trisomy** occurs when there are 3 copies of one of the chromosomes, perhaps from the egg or the sperm carrying both chromosomes in a pair, instead of one. The most common expressions are trisomy 13 (Patau syndrome), trisomy 18 (Edwards syndrome) and trisomy 21 (Down syndrome). Infants born with trisomy 13 or 18 rarely survive past one year old, due to resulting malformations of the brain, heart, lungs, and kidneys (Stanford Medicine Children's Health, n.d.). Down syndrome causes a spectrum of physical, mental, and developmental challenges, and can increase

the risk of congenital heart defects, hearing loss, and sleep apnea. However, most people with Down syndrome can live long and healthy lives with the appropriate support (CDC, 2024d). A **monosomy** occurs when there is a chromosome missing from a pair. Turner syndrome is caused by a partial or complete deletion of the second X chromosome in a genetic female. This syndrome causes suppressed physical growth, and possibly future reproductive and other health issues (Boston Children's Hospital, n.d.).

Prenatal testing can identify potential genetic disorders in the first or second trimester. Prenatal screening is done during the first trimester, and involves a blood test that checks fetal DNA matter found in the mother's bloodstream for genetic mutations like trisomies or monosomies. Nuchal translucency screening (NTS) is an ultrasound that measures the thickness of the neck of the fetus, as more fluid buildup can indicate an increased risk of trisomies. An anatomical ultrasound scan is also typically done around week 20 of pregnancy to measure fetal growth and screen for malformations of the head, internal organs, or limbs (ACOG, 2023b). Diagnostic tests cannot typically be done until the second trimester, and include taking samples from the amniotic fluid (amniocentesis) or placenta (chorionic villus sampling). While screening tests are highly accurate at predicting the risk for specific genetic disorders or malformations, diagnostic tests are usually used to confirm the presence of a disorder. Taking into account other risk factors like the parents' family history or genetic risks, and maternal age (pregnancy at over age 35 tends to increase certain risks), physicians may recommend less-invasive prenatal screening first, and then diagnostic testing if the screens indicate an increased risk (Johns Hopkins Medicine, 2021).

Genetic testing of parents prior to pregnancy and prenatal screening or diagnostics during pregnancy can help inform parents' decision making and family planning. Some parents may decide to not have children or adopt children if they are genetic carriers for certain syndromes. Considering a diagnosis where an infant would likely suffer and have a short life expectancy after birth, some parents may opt to terminate a pregnancy. Sometimes when a diagnosis is discovered and the pregnancy is continued, parents can make preparations for services and support for both themselves and an infant with a disability. Still other parents may prefer to not know a diagnosis until birth, as it would not change their plans. Regardless of parents' healthcare decisions, it is important that parents have access to accurate information regarding screening, diagnostic tests, and the potential impacts (ACOG, 2023b, Schneider, 2020).

Genetic screening also comes with ethical questions from a population perspective. Although substantial suffering and death from cruel diseases could potentially be prevented with genetic screening, emerging gene therapies, early medical intervention, and/or family planning, there is also the real risk of racism and ableism affecting genetic medicine. Historically, eugenics and racialized medicine have been used to justify atrocities: the Holocaust in Nazi Germany, forced sterilization of Black women and immigrants in the U.S., and other attempts at ethnic cleansing and harming or killing those with disabilities around the world. Even when genetic screening and counseling is done ethically, there is a risk of genetic information influencing a person's social life, their potential for employment, and thus also their ability to get health insurance coverage. Genetic testing and prenatal screening therefore should always be voluntary and confidential, include education and counseling, and include tests that are of high quality and evidence-based (Schneider, 2020).

References

References on this page can be found on the Chapter 9 references list from Erin Calderone's book.

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10.4.2: Epigenetics

Genes shape human health in important ways, obviously -- not only because some diseases are genetic, but also because some personality traits or aptitudes are influenced by genes. Genes are inherited and they don't change in a person's lifetime. An infant inherits a combination of their parents' genes -- some from each parent. Occasionally, in the process of an embryo forming, a gene may randomly mutate, leading to an infant having a gene that is slightly different from the genes of either parent. While the process of human evolution may change genes over many (many!) generations, that kind of change cannot happen within a single person's life, nor even in a few generations -- human evolution takes thousands of years. However, within one person's lifetime, genes DO turn on and off -- telling the body to create more of some proteins and less of another. How does that happen?

Epigenetics is a key to understanding how genes turn on and off. Our genes are surrounded by other molecules that can affect the gene, making them active or inactive. Those other molecules -- histones and methyl groups -- are affected by our environment. Epigenetics (literally, "on top of the genome") is the study of how that happens.

When I was growing up, the question of "nature or nurture" was quite common -- are humans shaped mainly by our genes or by our experiences and environment? The truth is, both have a huge effect. What epigenetics lets us see is, not only are we influenced by both nature and nurture, but in fact, nurture AFFECTS nature. Our life experiences cause chemical changes in our bodies that may turn on or off select genes.

Life experiences that *may* influence epigenetics include

- environmental exposures
- nutrition
- tobacco, alcohol, and other drug use
- traumatic experiences, from abuse to war
- poverty
- chronic discrimination or marginalization
- supportive interpersonal relationships

Epigenetics and MICH

What does this have to do with maternal, infant and child health?

While humans experience epigenetic changes across our whole lifespans, exposures and experiences in utero (prior to birth) and in early life have an especially important effect. The physical and mental health of the mother or pregnant parent, the home environment, the community environment, and in general, the stress levels surrounding the infant all have an effect on long-term health.

Here are a few examples of how maternal and infant health can be affected by epigenetic changes, drawn from scientific research cited below:

- Both male and female fertility can be affected epigenetically by long-term exposure to certain chemicals in the environment.
- Adequate nutrition and lower stress levels are associated with better brain development in infants.
- Care from a parent or other caregiver and healthy attachment can cause epigenetic changes associated with resiliency later in life, leading to better health outcomes.
- Poor nutrition can increase the likelihood of obesity and metabolic disorders later in life.
- Mental health outcomes later in life can be influenced by epigenetic changes in utero or in early life, positively or negatively.

Optional Video on Epigenetics

This short video from the BBC includes a not-too-technical explanation of how epigenetics works, how it relates to trauma specifically, and some promising directions for influencing epigenetics through medications or behaviors.

YouTube Video

This interactive element is not available in this format. Visit the link or scan the QR code to access it online.

View this YouTube Video online

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10.5: Age and Pregnancy

Pregnancy and birth always carry some health risks, at any age. But pregnancy risks rise at both ends of the age spectrum.

Advanced maternal age

After age 35, the risks associated with pregnancy tend to rise, both for the pregnant person (or mother) and the fetus, even in otherwise healthy individuals. (And the chance of having one or more chronic conditions rises with age -- so the percent of pregnant people with diabetes, high blood pressure, or other health conditions also rises with age.) According to the American College of Obstreticians and Gynecologists, pregnancy at an older age is associated with increased risk of obesity, gestational diabetes, and high blood pressure (including preeclampsia). The likelihood of induced labor and caesarian section in the birth also increased with age. For the fetus, older maternal age is associated with slightly greater risk of low birth weight, preterm birth, and neonatal intensive care admission (ACOG, 2026).

In 2020, nearly 19% of all pregnancies and 11% of all first pregnancies in the United States were in women aged 35 years and older (AGOG, 2026).

For these reasons, good prenatal care and postnatal care are especially important for older mothers (older birthing parents). Many people are not aware that risks begin to increase, by some measures as young as age 30, and certainly from age 35 or older.

Teen pregnancy

Pregnancy and birth during adolescence is an issue of particular concern. Teen pregnancy and birth carry serious health risks to both the birthing parent and the infant.

- **Teenage pregnancies can have serious health consequences on mother and baby**. Adolescents who give birth are at higher risk of pregnancy-related high blood pressure (preeclampsia), premature birth, low birth weight (in the infant), and other complications, including infant death (Medline Plus, 2024). There is even some evidence that adolescent pregnancy may be an indicator of higher risk of premature death, in young or middle adulthood (Ray, et al., 2024).

- There are substantial **economic consequences** as well, if pregnancy leads to leaving school early or postponing higher education. Teenagers who become pregnant and have a child are more likely than their peers who are not mothers to drop out of school, rely on public assistance, and/or live in poverty (Seabert, McKenzie, & Pinger, 2025).

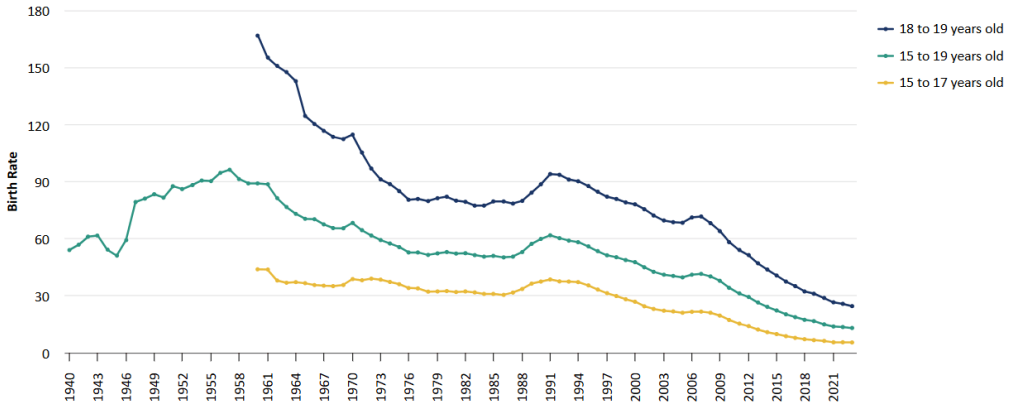
- Keep in mind that girls who become pregnant at a young age *may differ in some ways* from their peers already—they may already have greater exposure to health risks like abuse at home or from a partner, poverty, housing instability, or substance use. This makes it **hard to assess the distinct impact** of teen pregnancy.

For all of these reasons, public health efforts to prevent teen pregnancy and to promote positive futures for adolescents are important interventions. Technological advances in contraception have also helped. Perhaps changes in social norms or teen socializing patterns have had an effect. More teens are going to college -- and we know that having a future goal is associated with less chance of getting pregnant. All of these changes are having an effect!

Teen pregnancy rates in the US are currently at an historic low. According to a recent report prepared for Congress, "Since 2009, the teen birth rate has fallen to a new record low each year, with the most recent data reflecting a historical low of 13.1 in 2023—a 2% decrease from 2022 and a 68% decrease from the most recent peak observed in 2007." The chart below shows this decline:

Figure 1. Teen Birth Rate, 1940-2023

Figure is interactive in HTML report version.



Source: Figure created by CRS using data from the following: 1950-1959 data are from Stephanie J. Ventura et al., "Births to Teenagers in the United States, 1940–2000," National Vital Statistics Report, vol. 49, no. 10, September 2001, https://www.cdc.gov/nchs/data/nvsr/nvsr49/nvsr49_10.pdf; 1960-2009 data are from Stephanie J. Ventura et al., "National and State Patterns of Teen Births in the United States, 1940–2013," National Vital Statistics Report, vol. 63, no. 4, August 2014, https://www.cdc.gov/nchs/data/nvsr/nvsr63/nvsr63_04.pdf; 2010-2023 data are from "Births: Final Data for 2023." HHS. CDC. NCHS. National Vital Statistics Report. vol. 74. no. 1. March 2025.

Figure 10.5.1: Teen Birth Rate, US, 1940-2023 (Public domain; From Teen Births in the US, Overview and Recent Trends, https://www.congress.gov/crs-product/R45184)

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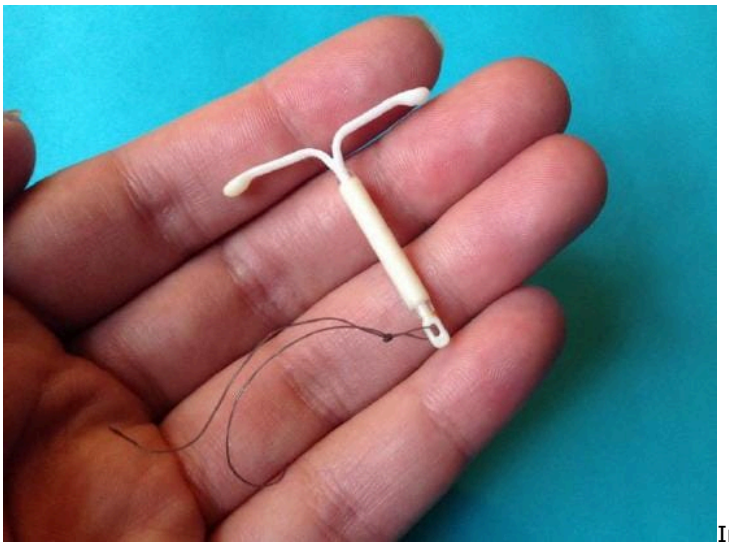
10.6: Family Planning / Contraception

Family Planning is process of determining the preferred number and spacing of children and choosing the appropriate means to accomplish it. Family planning puts greater choice and control in the hands of the individual or couple. Often the focus of family planning efforts is to give people with uteri (or couples) the ability to avoid unintended pregnancy. An unintended pregnancy is one that is either mistimed or unwanted. About half of all pregnancies are unintended.

Contraception is the broad term for birth control technologies -- ways to prevent pregnancy. The terms family planning and contraception are often used interchangeably.

Title X (pronounced Title Ten)

One important support for family planning services is Title X. Title X is a portion of the Public Health Service Act of 1970 that provides funds for family planning services for low-income people. More than 5 million women receive health care services at family planning clinics funded by Title X.



Increased access to family planning has also been an important outcome of the **Affordable Care Act** (Obamacare). Both the *appointment* with a doctor or nurse practitioner to select a means of contraception and the *prescription* for whatever means of contraception the patient selects have been included in the list of essential services in any insurance plan sold on one of the exchanges (like Covered California), under the ACA. This has meant no co-pay on office visits for contraception and no fee for the contraception method itself. Highly effective forms of birth control that previously may have been out of reach of lower-income and younger women have become accessible, due to the ACA. Without insurance, an IUD, for example, can cost $500-1000, including the medical visit.

Gag Rule in International Health

"Gag rule" is the term used to describe regulations that bar physicians and nurses in international clinics receiving U.S. federal funds from counseling clients about abortions. This rule has gone back and forth with which party holds the presidency. Since it was enacted in 1984 under Ronald Reagan, the "gag rule" has been in force under Republican presidents and has been lifted (or removed) under Democratic presidents.

This has major implications for international health, in particular, as family planning clinics around the world will lose funding.

Optional reading on the international "gag rule" (also called the "Mexico City Policy") and international health from Kaiser Family Foundation. Unintended consequences: evaluations of the effect of the gag rule have shown that it *increases* the rate of abortion, by denying women contraception.

Domestic Gag Rule and Title X Funding in the US

In March 2019, the Trump Administration imposed a "gag rule" on healthcare providers in the United States working in clinics funded under Title X, the first time such a rule was imposed in the US since Title X was enacted. For a clinic to continue to offer contraceptive care with Title X funding,its healthcare providers could not provide referrals to abortion providers, nor accurate health information about abortions. For providers like Planned Parenthood who provide both contraceptive services (some of which is funded by Title X) and abortion services, the new "gag rule" required certain physical and financial separations of those services that go beyond normal accounting procedures. As a result of this policy change, Planned Parenthood and some other healthcare organizations (including several state health agencies, like those in Massachusetts and Oregon) left the Title X program. The impact of this change on access to contraception was significant.

The domestic gag rule on clinics receiving Title X funding was lifted by the Biden Administration.

After President Trump returned to the White House in 2025, he continued to attack Title X. In the 2026 budget, he proposed total elimination of Title X (Commonwealth Fund, 2025). To date, the program has NOT been eliminated, but it has been affected by funding freezes, new regulations and requirements, and delays (KFF, 2026). Planned Parenthood clinics have been especially affected by changes in federal policy, as they were specifically denied eligibility for Medicaid funding in 2025 (KFF, 2026). Medicaid does not cover abortion services of any kind, so the Planned Parenthood services that were denied funding were regular doctor visits for reproductive or general healthcare.

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10.7: Abortion

The Epidemiology of Abortion

Abortion is one of the most common and most controversial procedures related to pregnancy.

Roe v. Wade is the name of the 1973 Supreme Court decision that made it unconstitutional for state laws to prohibit abortions before fetal viability (around 23 weeks). Before that, abortion was legal in a few states, but not many. Since Roe v. Wade, the number of women dying from illegal abortions diminished sharply.

In 2022, the Supreme Court, in a case known as Dobbs, overruled Roe v. Wade and now abortion is now severely restricted or banned in about half the states. This is having an enormous effect on health of people who can become pregnant and their families. In particular, it has made it more difficult to obtain an abortion without significant travel for people living in the 1/3 of US states that have now banned all or most abortions. About 11% pf abortions are known to be provided for women (or pregnant people) from a different state than where the clinic is located (Pew, 2024).

Abortion is a very common occurrence. Most abortions are in the first trimester.

- About 2/3 of all abortions occur among women aged 20-29. About 55% of people obtaining an abortion had already had at least one birth (Guttmacher, 2026).
- About 1 in 4 women in the United States has an abortion at some point in her reproductive years (Guttmacher, 2026).
- Rate of abortion dropped quite a lot between the 1970's and the late 2010's -- tied to the drop in unplanned pregnancies -- see chart below. It has increased recently, probably due to increased availability of medication abortions. While abortion dropped during a time of increasing restrictions on access (even before the Dobbs decision), we know that restrictions were not the primary driver of the reduction in abortions -- because the reduction was seen in all states, not just those with restrictive laws.
- About 93% of abortions in the United States are performed in the first trimester (first 12 weeks of pregnancy) (Pew, 2024). To be more precise, according to CDC data, in 2022 40% of abortions were obtained at six weeks' gestation or earlier, 53% at 7–13 weeks' gestation, and 7% at 14 weeks' gestation or later (Guttmacher, 2026).
- In 2023, medication abortions accounted for about 65% of all clinician-provided abortions in the US, up from 53% in 2020 (Guttmacher, 2026).
- Some abortions are "self-managed," not provided by a clinician, either medically or surgically -- we have very few statistics on this type of abortion. It is surmised that the rate of "self-managed" abortions has increased since the Dobbs decision, but that hypothesis is not yet supported with hard data.
- Complications from abortion are rare -- affecting about 2% of all people who have an abortion. Most complications are minor, such as pain and bleeding. Some complications are serious and require medical attention (Pew, 2024). The rate of complications from abortion is far lower than the rate of complications from childbirth (an estimated 13% of births involve major complications to the health of either the baby or the parent).

Trends in number of abortions in the US

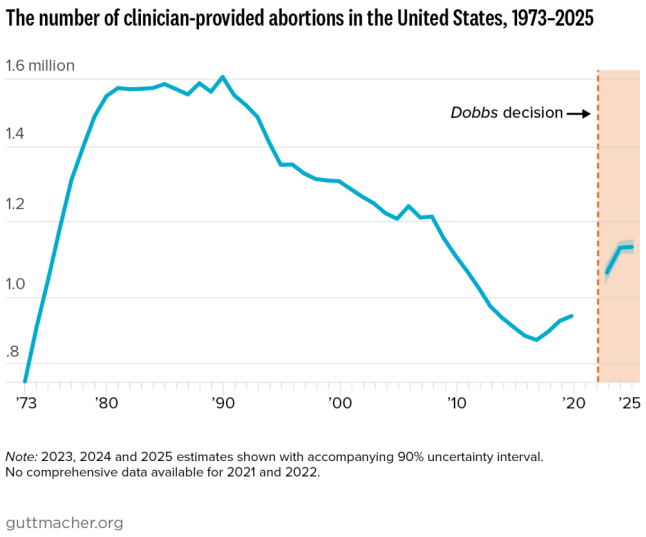


Figure 10.7.1: Number of Clinician-provided Abortions in US, 1973-2025. (Copyright?; Guttmacher Institute via https://www.guttmacher.org/fact-shee...-united-states)

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10.8: MATERNAL HEALTH

Maternal health focuses on the health of women (along with trans or nonbinary people capable of giving birth) in their **childbearing years** -- prior to pregnancy, during pregnancy and birth, in the postpartum period, and while caring for young children.

Some of the leading issues in maternal health include

- **prenatal and postpartum care**, including access, timing, quality, and cultural dimensions of that care;
- **safe births**, including hospital practices and safeguards, respecting the choices of the birthing parent, and avoiding unnecessary surgeries or interventions;
- **preventing maternal deaths** (maternal mortality).

People with Disabilities and Pregnancy

There is no reason why most women and other birthing parents with disabilities cannot have a safe pregnancy, give birth to a healthy baby, and enjoy parenting. However, there are precautions those with some disabilities must take when they are pregnant, and some will need more assistance than others. This short video highlights a clinic in Canada that specializes in providing pregnancy care to women with disabilities (optional). Public Health departments can take actions to make pregnancy and birth easier for people with disabilities, too.

Prenatal care

Prenatal Health Care is medical care provided to a pregnant woman from the time of conception until the birth process occurs. One common measure of population health is the percent of pregnant women (or birthing parents) who receive prenatal care in the first trimester.

Why is prenatal care so important?

1. It is fundamental to safe pregnancy and delivery.
2. It is associated with better health outcomes for mother and baby.
3. It reduces the likelihood of complications of pregnancy and birth.
4. It allows for monitoring of blood pressure, blood sugar, medications, nutrition, and other factors that can affect both the pregnant parent and the fetus.
5. It reduces the rate of preterm birth and low-birth-weight.
    - Definition: a low birth weight infant (LBW) = one that weighs less than 2500 grams or 5 lb. 8 oz. at birth; a very low birth weight infant (VLBW) = one that weighs less than 1500 grams or 3 lb. 5 oz. at birth.
    - Definition: preterm birth is a birth before 37 completed weeks of gestation.

The Affordable Care Act expanded access to prenatal care by making it an essential covered service, meaning most people can access it without a copay or deductible. This includes the prenatal visit itself, screenings or tests, and folic acid supplements. Folic acid, taken during the first trimester, can help prevent neural tube defects. Vaccinations can also be an important part of prenatal care.

Culturally-tailored and community-focused programs expand access to prenatal care among populations that have been underserved by the mainstream health system. Here are a few examples:

- The Black Infant Health Program
- The Community Health Representative program within the Indian Health Service
- The Centering Pregnancy approach, which is implemented in many clinics and hospital systems and seems to be especially well received among Latinas/x

For those interested in reducing health inequities in maternal health in California, this 2025 report has some interesting suggestions.

Safe Births

Safe births can happen through vaginal delivery or by Caesarian section (C-section). However, C-sections often have more complications, as they are a form of surgery. The World Health Organization recommends that no more than 10-15% of births be C-sections but in the US, the rate is much higher, and has tended to increase over the years. Almost one third of US babies are delivered by C-section (32.3% in 2023, according to the CDC). Public health efforts are aimed at reducing the rate of C-sections, both by addressing the factors in maternal health that can lead to necessary C-sections and by addressing the hospital policies and practices that can lead to unnecessary C-sections.

Part of safe births is responding to the choices of the birthing parent. For some, that can mean having a birth attended by a midwife or a doula (a nonclinical birthing assistant). So many factors are related to a person's ability to make their own choices related to reproduction, including insurance, access to day care, good employment with family leave benefits, access to information and education, support for chronic conditions that may precede pregnancy, social support, and more. The presence or absence of these translate into different levels of stress, choice, and ease for the birthing parent, the infant, and the family as a whole.

Postpartum Care

There has been an increasing focus on postpartum care in recent years, in part due to an awareness of the seriousness of postpartum depression and due to the increase in maternal mortality (with many of those deaths in the postpartum period). Postpartum means "after birth" and it refers to the period immediately after birth up to a year after. Some providers speak of the "fourth trimester," with a focus on the first three months after giving birth.

Postpartum care should be holistic in nature, monitoring the physical health of the new mother (or parent), the emotional or psychological health, and the social health. According to the American College of Obstreticians and Gynecologists, "The comprehensive postpartum visit should include a full assessment of physical, social, and psychological well-being, including the following domains: mood and emotional well-being; infant care and feeding; sexuality, contraception, and birth spacing; sleep and fatigue; physical recovery from birth; chronic disease management; and health maintenance." Assessment for social risks, from housing insecurity to domestic violence, is also an important component of postpartum care.

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10.8.1: Maternal Mortality

10.8.2: Crisis in Maternal Mortality - video

10.8.3: Life Course Perspective

10.8.4: California- A Partial Success Story in Saving Mothers' Lives

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10.8.1: Maternal Mortality

Maternal Mortality - an overview

Let's start with defining some terminology:

- **Maternal mortality** is defined as the death of a woman (or a birthing parent) while pregnant or within 42 days of termination of pregnancy from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.
- **Maternal mortality rate** - number of mothers dying per 100,000 live births in a given year
- **The maternal mortality ratio** -- the number of deaths per 100,000 live births
- **Disparity ratio in maternal mortality** -- usually refers to the ratio between the rate of maternal mortality for non-Hispanic Blacks and the rate of maternal mortality for whites.

The maternal mortality ratio has increased over time from 7.2 deaths per 100,000 live births in 1987 to 15.5 deaths per 100,000 live births in 2008. Then, rates continued to rise for the next 10+ years, in particular with a spike during the covid-19 pandemic. More recently, the maternal mortality rate for 2023 decreased to 18.6 deaths per 100,000 live births, compared with a rate of 22.3 in 2022 (CDC). However, that rate -- 18.6 deaths per 100,000 live births -- is still almost 3 times as high as the rate in 1987.

The US has the worst maternal mortality rate in the developed world (NPR and ProPublica). The rate in the US has generally increased in recent decades, while Europe, Canada, Australia, New Zealand and Japan have all seen decreases in maternal mortality.

There are many questions about the meaning of the rise in maternal mortality. To what extent is the rise due to new methods of surveillance of deaths? or due to higher rates of chronic health conditions that make birthing more dangerous? Or due to to healthcare quality at birth and the months immediately after birth?

The role of economic and racial inequality in maternal mortality has also been a subject of significant research. (KFF) See, for example, this 2024 article: Racial Disparities in Maternal and Infant Health. Inequities in maternal mortality are also being addressed through public health and grassroots efforts, such as those led by the Black Mamas Matter Alliance.

Most maternal deaths are preventable. This article from the New England Journal of Medicine (with podcast) highlights how hospitals and health systems can take practical steps *immediately* to reduce maternal mortality. These steps include addressing postpartum bleeding, severe hypertension, and blockages in the veins. Many of these steps were implemented in California successfully, as shown in a later page.

The following section from Erin Calderone's public health textbook on this topic gives **further detail** about the issue.

Maternal Mortality - Stats, Causes, Trends

At the time of this writing, maternal mortality rates in the U.S. have recently received a lot of media attention. According to the CDC, maternal mortality rates rose significantly between 2019 (20.1 deaths per 100,000 live births) and 2021 (32.9 deaths per 100,000 live births). Using data from death certificates collected by the National Vital Statistics System (NVSS), the CDC's most recent report states that 754 women died of maternal related causes in 2019, 861 died in 2020, and 1205 in 2021. Mortality rates are higher with increased age: the rate for women 40 and over was 6.8 times greater than the rate for women under 25 years of age. Additionally, these mortality rates demonstrate clear racial disparities: the rates for non-Hispanic Black women were 2.6 times the rates for non-Hispanic White women (Hoyert, 2023). Although the absolute number of maternal deaths may be small in comparison to overall deaths in women, the fact that these rates are increasing, combined with stark racial disparities, indicates the need for improvements in prenatal and maternal healthcare.

A recent study published in the American Journal of Obstetrics and Gynecology questions whether this dramatic increase in maternal mortality rates was potentially caused by a change in surveillance methods. Could this spike in death rates be factual, or could it be influenced by how maternal deaths are defined, and how physicians record them on the death certificate? The researchers also questioned whether the increase in maternal deaths was due to an increase in deaths associated with pregnancy

or the medical management of pregnancy, or whether other causes of death to women who have been pregnant at the time of death (or within the last year) were also included in the reporting - and thus skewed the data. When analyzing for specific causes of death, the rates of pregnancy and delivery-related mortality were essentially the same between 2018 and 2021. However, the research still confirmed that non-Hispanic Black women experience significantly higher mortality rates from pregnancy and delivery-related complications (Joseph et al., 2024). This research highlights the importance of care and attention to detail in epidemiological surveillance and in reporting health outcomes to the public.

If maternal mortality rates in the U.S. have remained stable over the last several years, they are still comparable or slightly higher than other countries with similar economic profiles and medical technology (OECD, 2023). Although medical advances have been made over the last century that have brought these rates down, there are still far too many deaths related to pregnancy and birth around the world. In low income countries the maternal mortality ratio (MMR - which is the number of maternal deaths per live births), can be as high as 430/100,00 live births. In high income countries the MMR is as low as 13/100,000 live births. Another way of comparing this is to consider the lifetime risk of a person who can become pregnant. The lifetime risk of a woman dying from pregnancy or birth-related complications is 1 in 49, compared to 1 in 5300 in high income countries (WHO, 2024b). Much of this risk has to do with access to healthcare- including a lack of skilled healthcare providers. Other risks include poverty, lack of education, and harmful gender norms and inequalities, as well as environmental issues that disrupt infrastructure and lead to other problems such as malnutrition or infection. The most common reasons for maternal deaths around the world are preventable, and include:

- severe bleeding (mostly bleeding after childbirth);
- infections (usually after childbirth);
- high blood pressure during pregnancy (pre-eclampsia and eclampsia);
- complications from delivery; and
- unsafe abortion (WHO, 2024b).

In the United States, a report published by the CDC states that 80% of maternal deaths are preventable. Causes include mental health conditions (including suicide and overdose/poisonings related to substance abuse), severe bleeding, infections, and other cardiovascular-related issues including pre-eclampsia and eclampsia (CDC, 2022c). Postpartum depression (PPD) is the most recognized mental health issue, and is generally considered to be depressive symptoms (feeling sad, down, irritable) within 4 weeks of delivery. However, research suggests that depression and anxiety are frequently experienced during pregnancy and within the first year of giving birth. According to recent research, PPD affects about 13% of American women after giving birth, and this rate can be significantly higher for teen mothers (between 53-61%). Other risk factors for PPD include a lack of social support, poverty, traumatic birth experiences, multiple births (such as twins or triplets), domestic violence, intimate partnership problems, as well as a prior or family history of depression and anxiety (NICHD, 2020). See Fig. 10.8.1.1 below for MMR by state 2018-2022.

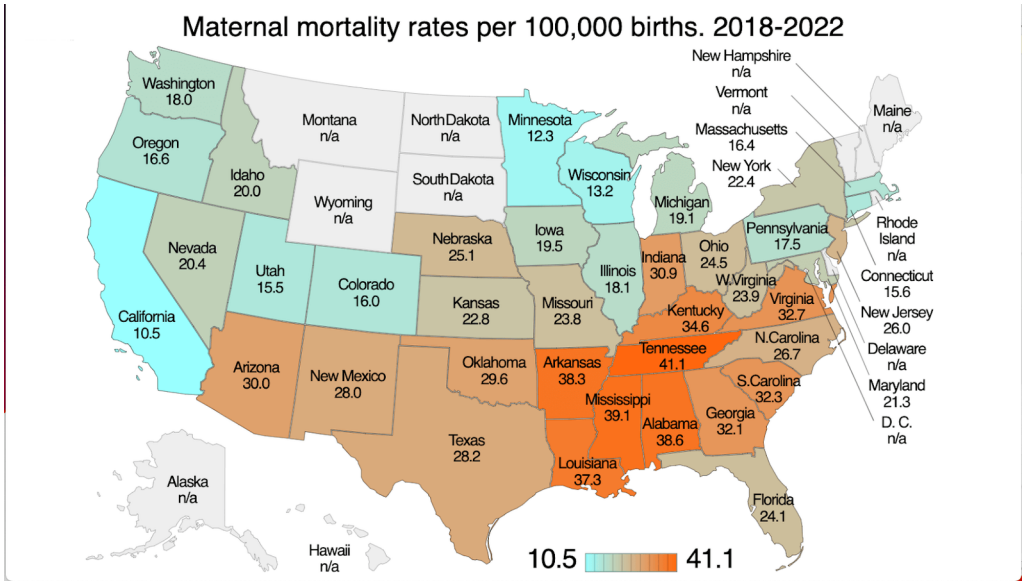


Figure 10.8.1.1: Maternal mortality rates per 100,000 births by state. US map derived from data published by the US Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS), and National Vital Statistics System (NVSS). (Copyright; Timeshifter from template. Wikimedia Commons. CC-BY-SA-4.0)

References

See links embedded in the Overview section and the following References Page for Calderone's textbook section.

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10.8.2: Crisis in Maternal Mortality - video

In 2024, PBS aired a three-part series, taking a closer look at the current crisis in maternal health, as well as steps being taken to improve maternal health. The focus is largely on preventing maternal mortality, although other maternal health concerns also are addressed. The first episode gives the landscape of maternal health and maternal mortality. The second and third episodes give a deeper dive into specific communities and health inequities. A transcript for each episode is also available on the PBS website. Each episode is under 30 minutes.

The Risk of Giving Birth

- Episode 1: A Maternal Health Crisis
- Episode 2: Black Maternal Health
- Episode 3: Latina Maternal Health

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10.8.3: Life Course Perspective

The life course perspective is the idea that human health is shaped cumulatively, influenced by all of the experiences and exposures that a person gathers over their life time. For MICH, this means that pregnancy outcomes are not only a result of events in the nine months of pregnancy; they are affected by everything that comes before. That "everything" includes personal health behaviors, public policies like healthcare laws, and social determinants of health like economic opportunity and exposure to racism or sexism.

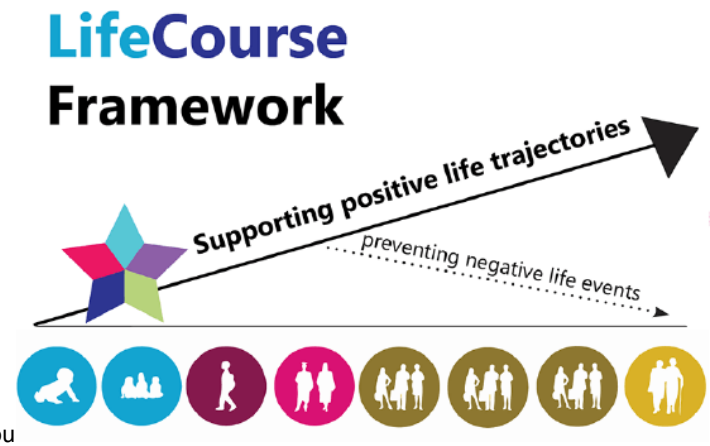
Please view this short video for a discussion of how racism can impact pregnancy outcomes, using the life course perspective.

YouTube Video

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View this YouTube Video online

The video clip above is from the series Unnatural Causes. This series is an older resource -- first aired in 2008 -- yet it still stands out among public health videos available for its detailed explanation of the social determinants on health. In the episode on MICH, "When the Bough Breaks," racial inequities in low birth weight are examined. While the statistics in the video may be out of date, many of the ideas and solutions are still current. One of those ideas is the life course perspective.



The life course perspective fits with public health's focus on about prevention and upstream interventions.

Whether we are discussing low birth weight babies, infant mortality, or maternal mortality, the life course perspective points to causes that occur *not only* during the 9 months of pregnancy, but also **at any time in a birthing parent's life prior to giving birth**. The accumulation of chronic stress adds to a person's "allostatic load," a measure of how stress is held in the body. This affects all the systems in a person's body -- the immune system, the circulatory system, the endocrine system, and more. What sources of stress can you imagine contributing to maternal and infant health outcomes?

The life course perspective applies to many aspects of health, not only MICH. Chronic conditions like heart disease and diabetes almost never have a single, discreet cause. By their very nature, they are **the accumulation of a lifetime of experiences**, up to the point when a person is diagnosed with the disease and afterwards. For this reason, public health puts a big emphasis on supporting good health early in life -- and ongoing.

The video below, from the Pan American Health Organization (PAHO), provides another description of the life course perspective. PAHO works similarly to the World Health Organization, as an intergovernmental organization focused on international health, but

with a focus only on the Americas.

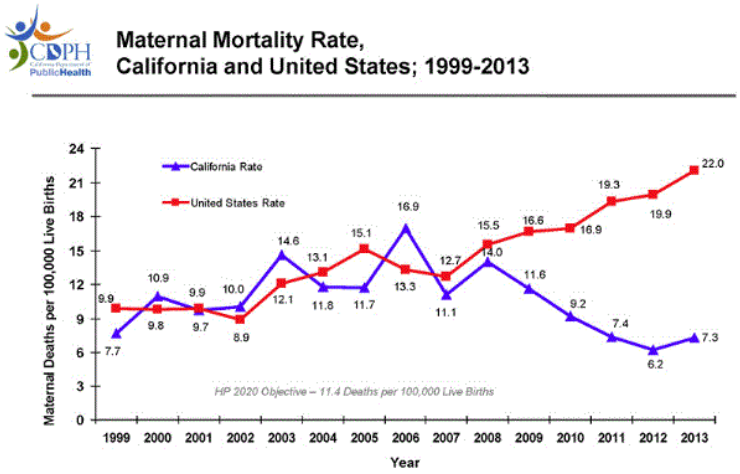
Think about it... what would it be like if every child...

- was conceived as a wanted pregnancy
- grew in the belly of a person who had access to good nutrition, no tobacco, physical activity, social support, joy and music in their life, and a degree of economic security that reduces stress
- was born in a safe environment into a loving family with high quality well-baby healthcare and good food and clean water
- went to good schools and had excellent opportunities for recreation and friendship and mentorship
- experienced adolescence as a time of appropriate challenge and support with opportunities to develop independence and good judgment
- entered the workforce at a time of economic opportunity and was treated with respect and encouragement at work, with opportunities to join unions or otherwise develop power on the job
- aged in a community that respected and cherished its elders

You see where this is going.... health is created over a lifetime! We don't have to live in a utopia where everything is perfect, but we can expand opportunities for a healthy life across the life span.

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10.8.4: California- A Partial Success Story in Saving Mothers' Lives



SOURCE: State of California, Department of Public Health, California Birth and Death Statistical Master Files, 1999-2013.

Figure 10.8.4.1: Maternal Mortality Rate, California and the US, 1999-2013 (Public domain; State of California, Dept. of Public Health via CDPH)

A headline reads, "To keep women from dying in childbirth, look to California." California has been a leader in collecting data on maternal mortality, bringing people together to analyze the data and find with practical solutions that can save women's lives. Major strides in saving lives have been possible through **innovative public health programs and policies** that help healthcare providers to recognize the signs of danger and respond quickly. As a result, maternal mortality is **decreased for several years in California**, while it was still rising in the rest of the country.

However, in recent years, especially **during the covid-19 pandemic**, California has seen an increase in maternal mortality again -- leading to the demand for new programs and new approaches. California still has one of the lowest rates of maternal mortality in the nation, yet still experiences a large number of preventable deaths. In addtion, serious disparities (inequities) persist, with significantly higher risk of death found among Black birthing people, people with lower educational levels, people living in worse community conditions, people with Medicaid (MediCal) insurance, people over age 40, and people living with obesity. More details on the data, the disparities, and the leading causes of maternal death can be found at this California Department of Public Health site.

DATA:

- In 2022, California's rate of pregnancy-related deaths decreased to 15.0 deaths for every 100,000 live births — down from rates of 21.6 in 2021 and 18.6 in 2020 during the COVID-19 peak.
- Before the COVID-19 pandemic, the rates were 12.8 in 2019 and 16.1 in 2018.
- As shown in the chart above, California rates were as low as 6.2 in 2012.

California launched a new plan in 2024, **Strong Start and Beyond**, to cut its maternal mortality rate in half by the end of 2026. The focus of this plan is to educate both providers and the public at large about risk factors to monitor in the perinatal period. For providers, there are specific tools recommended, like the Obstretric Morbidity Index. For the public, there is a questionnaire to use in the prenatal and postpartum period to help assess symptoms and risks, so that medical care can be accessed more quickly. "The vast majority of maternal deaths in California are caused by heart disease, hemorrhage and sepsis or other infections, according to state date," reports CalMatters. Early and appropriate intervention can prevent the majority of these deaths. Data in future years should indicate the relative success of this plan.

What Works for Reducing Maternal Mortality in California

Some of the main features of the approach California has used to reduce maternal mortality include the following:

- Collect the **data** through surveillance systems so we can identify how many deaths are happening, where they are happening, and what are the common features -- including establishing **review boards to discuss** every maternal death.
- Reduce **unnecessary C-sections**, as every surgery carries risk.
- Put in place measures to **respond quickly** to the biggest causes of maternal mortality. For example, hemorrhaging (excessive bleeding) was identified as a key factor in many maternal deaths. So California hospitals began to implement having certain supplies on carts in birthing rooms and recovery rooms, to address bleeding more quickly and effectively. This was part of a larger "quality improvement toolkit" that was developed collaboratively among hospitals, healthcare providers and public health researchers.
- **Educate** on and watch for warning signs. Cardiovascular disease has also been identified as a leading factor in maternal mortality -- so patients, families and healthcare providers can be more proactive in responding to cardiovascular warning signs, if they know to watch for them.
- **Implicit bias** has been identified as a specific risk factor contributing to health inequities, especially regarding maternal mortality for African American and Native American women. The California Dignity in Pregnancy and Childbirth Act (2019 Senate Bill 464) and the more recent AB 2319 require training to **reduce implicit bias** for all providers of perinatal care. Implicit bias refers to attitudes or stereotypes that affect our understanding, actions, and decisions in an unconscious manner.
- California now has an initiative to **address pregnancy-related suicide**. The problem of maternal mortality is quite complex, and a comprehensive approach will address all parts of the problem.

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10.9: INFANT HEALTH

Infant health depends on many factors including the parents' health and health behaviors prior to and during pregnancy, the level of prenatal care, the quality of care during delivery, and the infant's environment after birth. And more!

Many elements impacting an individual's health may be at play prior to their birth. This includes the health of biological parents prior to conception, genetic material combined at conception, maternal and fetal health during pregnancy, and the events of labor and delivery. Genetic components and the condition of gametes (sperm and ovum) affect the probability of conception and successful implantation in the uterus, as well as the potential for miscarriage. Environmental factors during pregnancy also have an effect on fetal development and future health; everything from the availability of nutrients, to exposure to toxins, and even levels of maternal stress can increase or decrease the risk of congenital defects or future diseases. Additionally, a variety of factors have an impact on both physical and mental health of the pregnant person during and after pregnancy.

Preterm birth and low birth weight

One key measure of infant health is to increase the proportion of babies born at full term. For public health, at the population level, this is a high priority. A related measure that we use to monitor the health of babies in a population -- as well as to clinically monitor the health of a specific baby -- is weight at birth.



Preterm births are defined as those prior to 37 weeks gestation. The rate of preterm births in the US rose from 9.6% in 2014 to 10.4% in 2024 (March of Dimes, 2026). Babies born premature are more likely to have a range of health problems, including having their organs not completely developed and having developmental delays.

About half of pre-term births have no clear cause. However, we can identify risk factors associated with higher rates of pre term births, such as past health history of the mother, tobacco and alcohol use, exposure to domestic violence, drug use, lack of social support, some infections, some chronic conditions, air pollution, lack of prenatal care, and being either younger than 17 or older than 35 years of age. Multiple births (twins, triplets, etc.) are also more likely to occur preterm, compared with singleton birth (one baby).

Low birth weight (LBW) is a term that refers to babies born weighing less than 2500 grams (about 5 lb. 8 oz.). A very low birth weight (VLBW) baby is one born weighing less than 1500 grams, or about 3 lbs. 5 oz.). Unfortunately, this is not a rare event. According to the March of Dimes, in 2024, **1 in 12 babies** (8.5% of live births) was low birthweight (LBW) in the United States.

There is considerable **overlap** between preterm births and LBW -- but some full term babies are still born with LBW.

Babies born preterm and/or with LBW are at higher rate of disability and death, along with difficulties with breathing, vision, and hearing (CDC, 2024).

The risk factors for having a baby with LBW are largely similar to those described above for preterm birth. These include behavioral risk factors like a pregnant person's diet, degree of weight gain, alcohol use, tobacco use, and timing of prenatal care. Public health programs can reduce these risks by improving access to care, patient education, nutrition support programs, smoking cessation, etc. Often, public policy can reduce risk factors across the population; for example, WIC and TANF programs expand access to healthy food, and the Affordable Care Act requires prenatal care be provided without a copay.

Other risk factors -- like the long term stresses of economic insecurity or exposure to racism (the social determinants of health discussed in an earlier chapter) -- are harder to change through behavioral interventions, yet they *can* be addressed through public policy and through community actions. A policy example: California requires maternal health providers to receive training to reduce implicit bias. A community example: the Abundant Birth Project attempts to reduce stress for Black and Pacific Islander birthing parents who are at increased risk by providing economic support during and after pregnancy.

Alcohol, Tobacco and Other Drugs during Pregnancy

Tobacco use during pregnancy is the leading modifiable risk factor for low birth weight and other poor birth outcomes. Exposure to second-hand smoke is also a risk to a growing fetus.

Alcohol and other drugs also contribute to poor birth outcomes and poor infant health. One of the most serious complications among newborns is fetal alcohol syndrome, which is on the more extreme end of a broader category of fetal alcohol spectrum disorders (FASD) (Mayo Clinic, 2024). Fetal alcohol syndrome refers to a group of abnormalities that may include growth retardation, abnormal appearance of face and head, and deficits of central nervous system function, including mental retardation, in babies born to mothers who have consumed heavy amounts of alcohol during their pregnancies. Babies born with any significant exposure to alcohol may experience effects including lower birth weight, learning difficulties, behavioral issues, and slower physical development.

Breastfeeding

Breastfeeding is a vital component of infant health. The American Academy of Pediatrics (AAP) recommends **exclusive breastfeeding for first six months of life** and continuing breastfeeding for two years or longer, as long as there is no medical reason not to (e.g., some condition or illness in the birthing parent or infant that makes breastfeeding impossible).

> From the AAP policy on breastfeeding: "Breastfeeding and human milk are the normative standards for infant feeding and nutrition. The short- and long-term medical and neurodevelopmental advantages of breastfeeding make breastfeeding, or the provision of human milk, a public health imperative. The American Academy of Pediatrics (AAP) recommends exclusive breastfeeding for approximately 6 months after birth. Furthermore, the AAP supports continued breastfeeding, along with appropriate complementary foods introduced at about 6 months, as long as mutually desired by mother and child for 2 years or beyond" (Meek & Noble, 2022, paragraph 1).

Breastfeeding supports the baby's immune function, and it is associated with a lower rate of chronic diseases later in life. It is also associated with decreased risk of obesity later in life.

Hospital policies can do a lot to support (or discourage) breastfeeding. The Baby-Friendly Hospital movement has supported **hospital policies** like rooming babies with their birthing parents, providing no other food than breast milk unless medically indicated, helping mothers or birthing parents initiate breastfeeding within an hour of birth, and other measures that make it more likely that the birthing parent will be able to breast feed her or their child. Doulas, midwives, and breastfeeding educators like those in La Leche League also can support a new parent with breastfeeding -- while breastfeeding is natural, it is not always easy!

Workplace policies also play a role. Can a birthing parent pump breast milk privately at work? Are breaks for breastfeeding provided? What about maternity leave or other paid family leave?

Sudden Infant Death Syndrome (SIDS)

SIDS refers to the sudden unanticipated death of an infant in whom, after examination, there is no recognized cause of death. It is a very tragic occurrence! It is also to some extent preventable. The national public health campaign, Safe to Sleep, taught parents to put babies to sleep on their backs, instead of their fronts or sides, and to reduce clutter in the crib (toys, blankets, etc.). This campaign had a stunning success rate -- rates of SIDS dropped by 30% in the first few years, and then reached and sustained a reduction of over 50% of death for many years. An uptick in SIDS deaths of 12% in 2020 and 2021 during the covid-19 pandemic may have resulted from less access to pediatric care and community programs during that time, and therefore some parents did not have the Safe to Sleep information needed. Rates of SIDS deaths declined again in 2023 and 2024. However, in 2025, the Trump Administration terminated this highly successful program -- the Safe to Sleep website is still up, but the program is no longer staffed, according to STATnews and NPR.

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10.9.1: Infant Mortality

10.9.2: Immunizations in Infancy and Childhood

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10.9.1: Infant Mortality

Terminology and recent data

Let's start with defining our terms.

- **Infant death** is defined as the death of a child younger than 1 year.
- **Infant mortality rate** - the number of deaths of children younger than 1 year per 1,000 live births.
- **Neonatal mortality** - deaths occurring during the first 28 days after birth
- **Post neonatal mortality** - deaths that occur between 28 days and 365 days after birth

In recent decades, we have seen substantial progress in lowering the infant mortality rate around the world. See the chart below.

Global Infant Mortality Data

This animation shows the change in the worldwide infant mortality rate from 1990 to 2023 (CC BY-4.0, World Bank via https://data.worldbank.org/indicator...023&start=1960).

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While there are still major inequities both between countries and within countries, the reduction in infant mortality from 64 deaths per 1000 live births to 27 deaths per 1000 live births is an enormous achievement. Currently, the average infant mortality for high income countries is 4 deaths per 1000, while the average for middle income countries is 26 per 1000 and for low income countries is 46 per 1000 (World Bank, 2026).

In the United States, the most recent infant mortality data (as of this writing) shows a rate higher than the average for high income countries (even though the US is THE highest income country in the world), at **5.6 deaths per 1000 live births**. There are substantial racial and regional differences in infant mortality rates in the US, with state rates of infant mortality ranging from 3.32 to 7.95 per 1000 live births. Non-Hispanic Blacks experience the highest infant mortality rate at 10.9 per 1000, followed by Native Americans (9.1), Pacific Islanders (8.5), Hispanic/Latinx (4.9), White (4.5) and Asian (3.5) populations (CDC, 2026).

Like we see in the global data, the infant mortality rate in the United States has decreased over time. In 1960, it was 25.9 infant deaths per 1000 live births; in 1980, it was 12.6 (cut in half). By 2010, it was cut in half again, down to 6.2. Progress has slowed in recent years; in the 12-year span between 2010 and 2022, the rate decreased by only 0.8, from 6.2 to 5.6 (World Bank, 2026).

Below, please find a discussion of infant mortality trends and common causes of disease among infants -- it is drawn from Erin Calderone's public health textbook.

Infant mortality and morbidity

Infant mortality is defined as the death of an infant between the day they are born and 1 year old (NICHD, 2021). The most recent report from the National Center for Health Statistics (NCHS) shows an increase of 3% in the U.S. infant mortality rate between 2021 (19,928) and 2022 (20,538). Rates for infant mortality are typically expressed as the number of deaths per 1,000 live births. Racial disparities are also found with infant mortality rates, with the lowest rates in 2022 for infants of Asian (3.60) and White

(4.52) and Hispanic mothers (4.88), followed by rates for infants of Native Hawaiian or Other Pacific Islander (8.50), American Indian/Alaskan Native (9.06), and Black mothers (10.86). The top five causes of death in infants are:

- congenital malformations
- premature birth and low birth weight
- sudden infant death syndrome (SIDS)
- unintentional injuries (accidents)
- maternal complications of pregnancy (Ely & Driscoll, 2023).

Exposure to toxins in the environment during fetal development can cause birth defects and potentially infant death. These toxins are referred to as **teratogens**. While some teratogens are well known, others have lesser known effects and are difficult to study due to the ethics of performing such research on pregnant people. Known teratogens include:

- Smoking, which can cause low birth weight,
- Alcohol consumption, which is linked to both physical and mental disabilities collectively called Fetal Alcohol Spectrum Disorders,
- Other drugs such as cocaine and heroin, which are associated with withdrawal symptoms after birth, and can cause impaired fetal growth, increase the risk of preterm birth and low birth weight, and are linked to learning disabilities and behavioral problems (Seabert et al., 2021),
- Radiation, which is associated with an increased risk for miscarriage, growth restriction, birth defects (including impaired brain function and malformations), as well as cancers (CDC, 2023c).

One of the most delicate systems during fetal development is the central nervous system (brain and spinal cord), which during the embryonic stage is called the “neural tube”. Supplementing with folic acid before and during pregnancy has been found to significantly reduce the risk of neural tube defects. The most common types of these birth defects are anencephaly and spina bifida. **Anencephaly** is an incomplete formation of the brain and skull, and typically causes death shortly after birth. **Spina Bifida** is a malformation of the spine which can cause paralysis or other physical disabilities. Anyone who can get pregnant or is intending to get pregnant is recommended to take prenatal supplements containing at least 400 micrograms of folic acid daily to prevent neural tube defects(CDC, 2022b). Two pivotal studies in the early 1990’s demonstrated a reduced neural tube defect risk of 72% or greater with folic acid supplementation, which prompted the FDA to require the addition of folic acid to enriched cereal products by the end of that decade. Adding folic acid to food sources increases health equity for those who may not be able to afford supplementation (Crider et al., 2022).

Infectious diseases such as syphilis and rubella can also have profound effects on a developing fetus. Congenital syphilis is passed through the placenta and can cause blindness and mental disabilities. Fortunately, syphilis is treatable with the antibiotic penicillin, even during pregnancy. Rubella is a virus which causes mild childhood illness but can cause deafness in a fetus if the mother contracts it during pregnancy. Rubella vaccines are typically part of childhood immunization schedules, and can prevent future deafness in offspring (Schneider, 2020). Lastly, toxoplasmosis is caused by a parasite that can be transmitted via eating undercooked, contaminated meat, or from indirect exposure to infected animals - particularly cats, through their feces. Although there might not be any symptoms present at birth, infants can develop severe brain and eye damage from congenital infection later on (CDC, 2022e). Zika virus is transmitted via mosquito bites, and although in adults it usually causes mild symptoms, infections during pregnancy can cause birth defects in about 5% of cases. Fetal transmission of Zika virus is associated with microcephaly - severely small infant head size at birth - and subsequent physical and mental disabilities such as difficulty feeding, seizures, and musculoskeletal issues (CDC, 2024i).

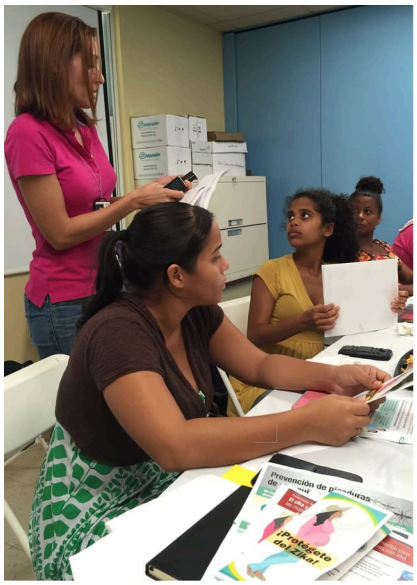


Figure 10.9.1.1: Focus group of pregnant women in Puerto Rico discussing how to improve Zika communications materials. (Maureen Fonseca-Ford, CDC/ CDC Connects, 2016)

This image was captured during the 2016, Zika outbreak in Puerto Rico, by CDC staffer, Maureen Fonseca-Ford, who described the scene as follows, “While on deployment to Puerto Rico for the Zika response in May 2016, I led a focus group on the island of Vieques, where an unlikely group of low income, low literacy, young pregnant women, were some of the participants. They gave us some of the richest feedback, for improving the Zika communication materials in Puerto Rico. We have been working with the CDC Division of Vector-Borne Diseases (DVBD), and US-Mexico Unit (USMU), on creating effective, field tested materials, and this experience was one of the first times in CDC’s outbreak history, where behavioral science has been included at the outset of the response. This was a joint effort with Puerto Rico’s Department of Public Health.”

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For citations listed in the paragraphs from Erin Calderone's text, please see Courses/Glendale_Community_College/Public_Health_101_(Calderone)/09%3A_Maternal_Infant_and_Child_Health_Concerns/9.20%3A_References

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10.9.2: Immunizations in Infancy and Childhood

Immunizations -- also called vaccines -- are one of the great public health success stories. Vaccination is listed first in a well-known CDC list of the ten greatest public health achievements of the 20th century, and the benefits of vaccination continue to this day. According to a 2024 report in the CDC's publication MMWR,

> "Among children born during 1994–2023, routine childhood vaccinations will have prevented approximately 508 million cases of illness, 32 million hospitalizations, and 1,129,000 deaths, resulting in direct savings of $540 billion and societal savings of $2.7 trillion" (Zhou, Jatlaoui, et al, 2024, p. 682).

That's a lot of lives saved.

Yet in some ways, vaccines have fallen victim to their own success. These days, many people living in the US and other developed nations don't have a lived experience of measles, whooping cough, polio, and other childhood diseases that once were common. Many people don't know how dangerous these infections are -- for example, 1 in 5 unvaccinated people with measles will need hospitalization, and 1 to 3 children out of 1000 with measles will die. Even those who don't die may experience long-term health effects. Without personal experience of vaccine-preventable diseases, even the very small dangers associated with vaccination can loom large. This is particularly true in a media environment that too often emphasizes rare events, unproven theories, and fear mongering.

Infant and childhood vaccination rates still high but decreasing

Most parents want to give their children the best chance at good health. Most pediatricians recommend a full schedule of vaccination for infants and children. While some parents do delay certain vaccines -- whether due to barriers to getting healthcare or due to concerns about vaccines -- it is still "the norm" for children to be vaccinated against a number of important infectious diseases. (Here's a plain-language explanation of how vaccines work: Vaccines Prevent Illness from Hesperian Health Guides.)

According to the CDC, in the 2025-2026 school year, 92% of children has received the diphtheria, tetanus, and acellular pertussis vaccine (DTaP) and 92.4% received the vaccine for measles, mumps, and rubella vaccine (MMR) and polio vaccine. Yet those rates vary a great deal by state and location - Idaho had a rate of 74.6% while Connecticut had a rate of 98.4%. Over recent years, the rates of vaccination have decreased significantly.

Different diseases require different coverage (the percent of population vaccinated) to protect from outbreaks (and in particular, to protect children too young or too vulnerable to be vaccinated). The protection against outbreaks that is afforded by high rates of immunity in the population (ether through vaccination or through naturally-acquired immunity following illness) is called HERD IMMUNITY or COMMUNITY IMMUNITY. Highly contagious diseases need a higher percent of the population to be immune to reach herd immunity. Measles is one of the most contagious diseases in the world -- it requires a herd immunity of 95% (meaning 95% of people have either been vaccinated or previously recovered from a measles infection), a level that the US has not reached for several years. As of the 2025-2026 school year, three quarters of states have MMR vaccination rates below 95% (KFF). As a result, the US has had several serious measles outbreaks, thousands of hospitalizations, and at least five deaths.

For more information on herd immunity, see Community Immunity.

Public health efforts are important to educate people about the importance and safety of vaccines. Research has shown that engaging communities through tailored communications, community leadership engagement, and local organizations, alongside the vital work of primary care doctors and nurses in clinics, is effective in maintaining and increasing vaccination rates in global health. The authors state, "Community engagement should be recognized as a core pillar of vaccination strategy rather than an optional addition. It builds trust, fosters ownership, and addressed sociocultural barriers to access." (Polonsky, et al., 2026).

Recommended schedule of vaccinations for infants and children

In recent years, there has been a divergence between the recommended schedule of vaccinations for infants and children supported by the American Academy of Pediatrics (which addresses 18 serious diseases) and that supported by the CDC, under the leadership of HHS Secretary Robert F. Kennedy Jr. and NIH & Acting CDC Director Jay Bhattyachara (which addresses only 14 diseases). Additional executive orders from President Trump have further altered the guidance on vaccination during infancy

and childhood. This has created some confusion for parents and may be contributing to declining rates of vaccination.

It is beyond the scope of this chapter to explore all the science and politics behind recent changes to the recommended immunization schedule, rich as that might be to explore.

This article from the HealthyChildren site, All About the AAP Recommended Vaccine Schedule, sponsored by the American Academy of Pediatrics, explains the more comprehensive schedule of vaccination for infants and children, as well as the reasoning for continuing to vaccinate against diseases we rarely see, so that they don't make a comeback (the way measles and pertussis have in recent years).

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10.10: CHILDHOOD HEALTH

Leading Concerns in Children's Health

Childhood can be defined many ways, but many public health programs define it as the ages between 1 and 9.

Public health surveillance or assessment efforts focus on two main categories of measurement -- **childhood mortality** (the most severe measures of health in children) and **childhood morbidity** (sickness and injury).

A recent review comparing childhood health in the US to other middle-income and wealthy nations (here called the OECD18) found that

> From 2007 to 2022, infants (<1 year old) were 1.78 (95% CI, 1.78-1.79) and 1- to 19-year-old individuals were 1.80 (95% CI, 1.80-1.80) times more likely to die in the US than in the OECD18. The 2 causes of death with the largest net difference between the US and OECD18 were prematurity (RR, 2.22 [95% CI, 2.20-2.24]) and sudden unexpected infant death (RR, 2.39 [95% CI, 2.35-2.43]) for infants 12 months or younger, and firearm-related incidents (RR, 15.34 [95% CI, 14.89-15.80]) and motor vehicle crashes (RR, 2.45 [95% CI, 2.42-2.48]) for 1- to 19-year-old individuals (Forest, et al., 2025, Abstract).

That means that in the US, infants, children and adolescents are almost TWICE as likely to die, compared to infants, children and adolescents other well-off countries. So we certainly have a problem with child health in the United States. That may also predict worsening adult health, as these children grow up. As of 2022, the National Center for Health Statistics reports that 1.5% of children under 4 and 2.2% of children between the ages of 5-11 are in fair or poor health. Additionally, 8% of elementary school-aged children missed 11+ days of the school year due to an illness, injury, or disability (CDC/National Center for Health Statistics, 2024).

Common health risks in childhood include

> **Unintentional injuries** (such as motor vehicle crashes) are the leading cause of childhood deaths.
>
> **Intentional injuries** (especially those associated with firearms).
>
> **Poor nutrition, lack of physical activity, stress, and poor sleep** as these are all risk factors for chronic diseases. Indeed, we have seen an increase in the diagnosis of chronic diseases like diabetes among children and adolescents in recent years ("From 2011 to 2023, the prevalence of 3- to 17-year-old individuals with a chronic condition rose from 39.9% to 45.7%" (Forest, et al., 2025, Abstract).
>
> **Child maltreatment** often leaves long-lasting scars, both physical and emotional or psychological. Child maltreatment includes neglect (the most common form of maltreatment), physical abuse, sexual abuse, emotional abuse, and other types of maltreatment.
>
> **Infectious diseases** were at one time the leading health concern for children in the United States -- and they continue to claim the lives of many children internationally. However, improvements in vaccination programs led to a substantial reduction in infectious diseases among children. Similarly, gaps in vaccination also expose children to increased risks of infectious disease.

Investing in children at the community level

There is such a big payoff of investing in children's health -- effects that carry forward through their lives. This OPTIONAL essay describes a small working class town in the Salinas Valley, called Gonzales that has achieved a lot by investing in children. Maybe you'll find it inspiring as I did! The town goes beyond helping individuals develop knowledge or skills to actually change the community conditions that children grow and thrive in. And the voices of youth and children are listened to in making decisions about their lives! For example, deciding on the design of a new tot lot? "No one over the age of 5 got to vote on that." Those most involved get to decide -- I love that idea.

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10.10.1: Leading Causes of Morbidity and Mortality

10.10.2: Health Concerns for Children

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10.10.1: Leading Causes of Morbidity and Mortality

In 2022, 4,156 U.S. children under 4 (28.0 per 100,000 population), and 6,239 children between 5-14 (15.3 per 100,000 population) lost their lives. The leading causes of death for children are not chronic lifestyle-related diseases or infectious diseases - although both of these are still health concerns for children. Importantly, the leading cause of death for children is unintentional injuries (accidents), which can often be prevented with safety technology, regulations, and behaviors. Below are the top 3 leading causes of death for children in different age groups in 2022 (CDC/National Center for Health Statistics, 2024b):

- 1-4 years of age
  - Accidents (unintentional injuries)
  - Congenital malformations, deformations and chromosomal abnormalities
  - Assault (homicide)
- 5-9 years of age
  - Accidents (unintentional injuries)
  - Cancer
  - Congenital malformations, deformations and chromosomal abnormalities
- 10-14 years of age
  - Accidents (unintentional injuries)
  - Intentional self-harm (suicide)
  - Cancer

Accidents (unintentional injuries), include car accidents, drowning, falls, fires or burns, accidental poisoning, and suffocation. Toddlers have the highest risks for drowning. Car accidents are the highest risk of mortality for all children, and are often related to the inappropriate use or lack of seatbelts or car seats (Seabert et al., 2021). A very concerning trend is that of firearm injuries and deaths. If we combine causes of death for children and adolescents, there were more firearm related deaths in 2022 than car accident deaths. Firearm deaths include both firearm accidents (such as children playing with a firearm, or accidental discharge), assault or homicide with a firearm, and suicide. From 2019 to 2022 the number of firearm deaths for those under 18 increased by 46%, demonstrating this growing problem. And firearm deaths disproportionately affect Black children and adolescents at nearly 6 times the rate of other races/ethnicities, and American/Indian Alaskan Native children and adolescents at 3 times the rate of other races/ethnicities. Death rates from firearms are also 4 times higher in boys than in girls. The highest risk of gun death for young people of all ages comes from assault, followed by suicide for adolescents, and accidental gun deaths for children (Panchal, 2024). Violence is a significant public health problem, particularly for children and youth.

References for this page can be found at this link in Calderone's book.

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10.10.2: Health Concerns for Children

Children are dependent on parents, guardians, teachers, and caregivers to provide safe environments that meet their physical and emotional needs, allowing them to grow and mature. This includes not only providing for physiological needs such as food, water, clothing, and sleep, but also emotional stability, comfort, physical safety, and intellectual stimulation, along with developmentally appropriate education. Certainly no parents or caregivers are “perfect”, and there are a wide array of parenting styles which can promote healthy growth and behaviors. The most important thing is to protect children from adverse childhood experiences (ACEs), which can have a substantial impact on their current and future health and well-being, as well as that of future generations.

Child maltreatment includes neglect and abuse of any form (physical, sexual, psychological). Failing to provide children with food, water, clothing, medicine, and supervision are considered child neglect. Emotional and verbal neglect and abuse often go unnoticed, yet can cause significant psychological damage to children. All of these forms of maltreatment qualify as adverse childhood experiences (ACEs) and have both acute and long term impacts on children. Maltreatment can be committed by parents or caregivers, or another person supervising the child such as a teacher or clergy member. Beyond the immediate potential harm from bruises, cuts, burns, or broken bones, children who have experienced ACEs tend to have maladaptive coping mechanisms, harmful behaviors towards others (such as bullying), and engage in more health-risk behaviors such as drug use, dangerous driving, and risky sexual behavior. They are at higher risk for health problems like sexually-transmitted infections, cancers, obesity, and early death from all causes. Adults who have experienced neglect and abuse during childhood can have post-traumatic stress disorder, attention and learning difficulties, and it can affect their academic and employment/economic prospects. They may also be more likely to commit acts of abuse or neglect on their own children. Nationally, it is estimated that at least 1 in 7 children experience abuse or neglect in the past year (CDC, 2024b, Seabert et al., 2021).

Children should also get routine vaccinations in order to prevent deadly infectious diseases. Thanks to programs like Vaccines for Children providing free immunizations to poor, uninsured and underinsured children, the availability of vaccines is quite high in the U.S. However, misinformation in recent years has caused some parents to avoid or delay vaccination, thus decreasing population immunity and increasing the risk of outbreaks - even in vaccinated children (Seabert et al., 2021). See chapters 3, 5, and 7 of this text for more on vaccines and vaccine hesitancy.

Childhood obesity is also a growing problem. While the rates of childhood obesity are certainly lower than adult obesity, nearly 1 out of every 5 children in the U.S. has obesity. Obesity in children and adolescents is determined by comparing body mass index (BMI) to normative values (referencing them to other children/teens) for their age and gender. A child or teen with a BMI above the 95th percentile is considered to have obesity. Due to the nonlinear pattern of growth during childhood and adolescence, it is typical that children will go through phases where they have more or less body fat on them - and this may be essential for growth spurts. However, too much body fat increases the risk for obesity and chronic diseases during adulthood, and impacts the quality of life of children. Kids with obesity may not be comfortable participating in physical activity, they are at a higher risk for asthma, sleep apnea and bone and joint problems, they may face stigma at school, and their mental and emotional health can suffer (CDC, 2024c).

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10.11: PUBLIC HEALTH PROGRAMS FOR MICH

Section from Erin's text

Postpartum home visitations by nurses can help to reduce incidences of child maltreatment, and improve postpartum psychosocial outcomes. Nurses in one study provided 1-3 home visits after the birth of a baby, to provide support and resources for parental and infant health, managing infant crying, and connecting parents with other community support they might need. The nurses also screened for potential problems like family violence or substance abuse, and provided referrals for further interventions if needed (Dodge et al., 2019).

Sudden Infant Death Syndrome (SIDS) is the sudden death of an infant before the age of 1 - typically occurs in their sleep - and cannot otherwise be explained. Most of these deaths happen in cribs, and although specific causes are often unknown, several risk and protective factors have been identified. Eliminating smoking from the home, placing a baby to sleep on their backs, and removing any blankets, toys, or other objects from the crib have been shown to be effective protective measures against SIDS. In fact, since the beginning of the “Back to Sleep” campaign in 1994 (now called “Safe to Sleep), SIDS rates have dropped from 130.3 to 38.4 per 100,000 live births (between 1990-2020) (CDC, 2024e, U.S. Department of Health and Human Services, n.d.).

end section

Header about community and public health programs for MICH?

Some are Categorical programs - meaning, programs available only to people who can be categorized into a group based on specific variables.

Others are open to all people in the community, or all mothers and children.

The Maternal and Child Health Bureau was established in 1990. It administers Title V funding. This is an agency you might not see directly -- it doesn't have an office near you -- but it probably funds a community program near you, maybe one that you yourself have used. It is "Responsible for promoting and improving the health of our nation's mothers and children," a big job. Like many public health programs, it runs in the background. It accomplishes goals through administering four core public health services:

1. Infrastructure-building services
2. Population-based services
3. Enabling services
4. Direct health care (gap-filling) services

Women, Infants, and Children Program (WIC) is a clinic-based program designed to provide nutritional and health-related goods and services. WIC is for pregnant and postpartum women, infants up to one year of age, and children up to age five. Participants must meet other eligibility criteria. WIC is sponsored by U.S. Department of Agriculture (USDA). It has proven to be one of the most effective ways to improve health of mothers, infants, and young children.



Providing Health Insurance for Women, Infants, and Children is also key. There are two principle government programs aimed at providing health care coverage for low-income children: Medicaid and State Children's Health Insurance Program (CHIP). We will look at both of these more closely when we get to the chapter on healthcare policy and health insurance systems.

Paid Family leave and Pregnancy Leave -- an issue for family health

Here is a news story about the lack of paid family leave or pregnancy leave in the US -- a gap in the safety net that has serious implications for health.

Providing Child Care.

High-Quality Child Care is an important component of child heath. Many developed countries provide child care for all, but the US does not. Over a third of all young children in the US are in child care, and this can be a major financial burden on working class and middle class families.

(If you want to get a more in-depth analysis of the need for publicly-subsidized childcare in California, check out all or part of this webinar filmed in early 2019 (optional).)

One policy the US does have to support caretakers of small children is the **Family and Medical Leave Act (FMLA)** - a federal law that provides up to 12-week unpaid leave to men and women after the birth of a child, an adoption, or an event of illness in the immediate family. **In California**, people who take a leave under the FMLA are able to apply for **disability payments,** so that their leave does not have to be entirely unpaid.

Other Advocates for Children

There are many other advocates for children. Here in San Francisco, I can think of many: Coleman Advocates, Safe and Sound, Sister Song Network for reproductive justice and many others.

Here are some national groups highlighted in your ICPH textbook:

- **Children's Defense Fund** - works to create a network so tight no child can slip through the cracks
- **United Nations Children's Fund** (UNICEF) - only organization of the United Nations assigned exclusively to children; works to improve child conditions through community-based services in primary health care, basic education;and safe water and sanitation in developing countries

- **American Academy of Pediatrics** - independent pediatric forum to address children's needs

10.11.1: Social Ecological Model to Reduce LBW and Preterm Birth

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10.11.1: Social Ecological Model to Reduce LBW and Preterm Birth

As was stated at the start of this chapter, maternal, infant and child health is one of the most important indicators of overall population health. (A country that protects the health of babies usually has good adult health, too.) As we've seen throughout this book, health is the result of MANY interrelated factors -- an ecology of health.

Let's use **the social ecological model** to outline personal and public health interventions to improve infant health.



Here are examples of actions that can be taken to prevent LBW and preterm birth.

At the individual level....

A pregnant person can schedule prenatal care visits in the first trimester of pregnancy, avoid tobacco, eat nutritious food, get exercise, manage stress, and monitor blood pressure. (Community based programs and clinical practices can support these actions.)

At the relationship level ....

Family and friends of pregnant people can support a healthy birth by contributing to a harmonious home, sharing walks or dancing or other physical activity, support good eating habits, and work to reduce the sources of stress in a loved one's life.

At the community level ...

Community services can create greater awareness of perinatal risks and methods to reduce that risk. Clinics can conduct outreach to enroll people in services as needed, including prenatal care. Local ordinances can reduce exposure to tobacco smoke by banning smoking in various settings. Centering Pregnancy is an example of a clinic-based culturally-sensitive program to improve birth outcomes. Community organizing for better economic opportunities, ending discrimination, and supporting education can also help.

At the societal level....

Policies can support family leave and benefits, to enable parents to take more time away from work before and after they give birth. A social safety net can reduce stress for the population as a whole. This NPR story about giving birth in France highlights what a difference pro-baby public policies can make.

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INDEX

A

academic integrity
4.22: The Value of Deeper Research

accountability
9.21: Culturally and Linguistically Appropriate Services (CLAS) Standards

accuracy
4.19: Health Information

activism
7.4: Environmental Health and the Emergence of the Modern Environmental Movement

acute
5.1: Learning Outcomes
5.3: Classification of Diseases

adaptation
7.15: Preventing Climate Change and Adapting to Climate Change
7.16: Co-Benefits of Taking Steps to Address Climate Change

adult obesity
8.4: Americans have gained weight

advocacy
6.3: What Is Community Organizing?

Affordable Care Act
9.7: Issues with Data and with the Classifications

african american
9.23: What does a successful response look like?

African American communities
10.8.3: Life Course Perspective

AfricanAmericans
9.10: African Americans- Health overview and leading causes of death

agent of change
6.8: Why community organizing for public health?

air pollutants
7.6: Laws to Protect the Environment and Human Health

air pollution
5.14: The Multi-Causation Model and the Ecological Model

air quality
7: Environmental Health
7.2: Learning Outcomes

airpollutants
7.18: Additional Resources

AlaskanNatives
9.12: American Indians and Alaska Natives- Health overview and leading causes of death

alcohol consumption
2.13: Public Health Involves Making Public Policy for the Public Good

alternativeenergy
7.15: Preventing Climate Change and Adapting to Climate Change

AmericanIndians
9.12: American Indians and Alaska Natives- Health overview and leading causes of death

ancestry
9.8: Snapshots of the Health of Racial and Ethnic Groups in the US

approaches
1.15: Additional Resources

Asian Americans
9.11: Asian Americans and Pacific Islanders- Health overview and leading causes of death

assessment
1.1: Student learning outcomes (goals) for this week

assurance
1.1: Student learning outcomes (goals) for this week

asylum
9.13: Immigrant and Refugee Health

attitudes
9.18: Cultural Competency

B

bacteria
5.6: Types of Infectious Agents

barriers
9.20: Cultural Barriers to Care

basic income
3.13: Change Can Happen

behavior
4.16: Causation
5.13: Multi-Causation Models of Disease

behavior changes
6.11: Health Promotion Programs

behavioral determinants
3.2: What are "social determinants of health?"

behavioral health
1.12: Twenty-First Century Public Health

behaviors
4.9: Cases and Rates

beliefs
9.18: Cultural Competency

biological determinants
3.2: What are "social determinants of health?"

biostatistics
4.6: Public Health Statistics

birthjustice
6.6: More Examples of Organizing

BMI
8.4: Americans have gained weight

BodyMassIndex
8.1: Learning Outcomes (goals for this module)

brainhealth
3.7: Embodiment

breastcancer
1.8.1: The Social Ecological Model- Breast Cancer example

breastfeeding
8.8: What causes obesity? What causes the diseases associated with obesity?

C

California
10.8.4: California- A Partial Success Story in Saving Mothers' Lives

campaign implementation
6.4: Organizing steps in a campaign for change

campaign steps
6.4: Organizing steps in a campaign for change

cancer
4.9: Cases and Rates
5.12: Noncommunicable Diseases
5.15: Prioritizing Prevention and Control Efforts
5.20: Examples of Prevention of Noncommunicable Diseases using the 3 levels of prevention
8.5: ONE VIEW- Obesity - the most serious health problem of our day!

cancer prevention
1.6: Factors that Contribute to Health

cancerscreening
9.15: Health Disparities in Specific Health Conditions

capacity building
3.11: Actions that work toward equality and health
6.3: What Is Community Organizing?

capacity development
6.1: Learning Outcomes

carbon pollution
7.12: Climate Change and Environmental Health

carbonemissions
7.15: Preventing Climate Change and Adapting to Climate Change

carbonpollution
7.16: Co-Benefits of Taking Steps to Address Climate Change

cardiovasculardiseases
9.15: Health Disparities in Specific Health Conditions

cardiovascularsystem
3.7: Embodiment

case fatality rate
4.11: Tracking the Spread of Covid-19

Causation
4.16: Causation

causes
5.13: Multi-Causation Models of Disease

CDC
1.10: Twentieth Century Public Health
2.2: How Public Health Is Organized
2.9: Challenges within the Public Health System
8.5: ONE VIEW- Obesity - the most serious health problem of our day!

Census
4.13: Secondary Data

CFR
4.11: Tracking the Spread of Covid-19

chemicals
7.5: Measuring Risk

child health
2.10: Example of Public Health Organizations Working Together

child poverty
3.13: Change Can Happen

childhood obesity
8.4: Americans have gained weight

cholera
4.4: Public Health Responses to Epidemics
7.4: Environmental Health and the Emergence of the Modern Environmental Movement
chronic
5.1: Learning Outcomes
5.3: Classification of Diseases
chronic conditions
10.8.3: Life Course Perspective
4.10: Morbidity and Mortality
chronic disease
1.10: Twentieth Century Public Health
8.2: Obesity- A controversy
8.3: Regarding obesity, we have at least two controversies
8.4: Americans have gained weight
chronic diseases
5.12: Noncommunicable Diseases
5.15: Prioritizing Prevention and Control Efforts
5.4: Genetic Diseases
8: Weight, weight bias, nutrition and physical activity
chronic stress
10.8.3: Life Course Perspective
chronic_disease
5: The Prevention and Control of Diseases
chronic_diseases
8.8: What causes obesity? What causes the diseases associated with obesity?
chronicdiseases
2.5.1: Organization within a public health department
8.1: Learning Outcomes (goals for this module)
chronicstress
3.7: Embodiment
CHWs
6.9: Applying the Roles of the CHW to a Case Study
CID
7.18: Additional Resources
circulatoryhealth
7.16: Co-Benefits of Taking Steps to Address Climate Change
citizenship
9.7: Issues with Data and with the Classifications
civic engagement
3.4: Ecological Model and the Social Determinants
classification
5.3: Classification of Diseases
Clean Air Act
7.2: Learning Outcomes
7.6: Laws to Protect the Environment and Human Health
Clean Water Act
7.2: Learning Outcomes
7.6: Laws to Protect the Environment and Human Health
cleanwater
7.4: Environmental Health and the Emergence of the Modern Environmental Movement
climate
7.12: Climate Change and Environmental Health
climate change
1.12: Twenty-First Century Public Health
7: Environmental Health
7.12: Climate Change and Environmental Health
7.2: Learning Outcomes
7.6: Laws to Protect the Environment and Human Health
climate disaster
9.13: Immigrant and Refugee Health
climate policy
7.12: Climate Change and Environmental Health
climatechange
1.13: World Health
7.15: Preventing Climate Change and Adapting to Climate Change
7.16: Co-Benefits of Taking Steps to Address Climate Change
clinical medicine
1.4: Public Health and Medicine
clinicalmedicine
1: Core Concepts and History of Public Health
coalition
6.4: Organizing steps in a campaign for change
collaboration
2: Organizations of Public Health
6: Community Organizing, Community Building, and Health Promotion
6.9: Applying the Roles of the CHW to a Case Study
collective empowerment
6.8: Why community organizing for public health?
collective identity
9.11: Asian Americans and Pacific Islanders- Health overview and leading causes of death
collective responsibility
1.16: Summary
college education
4.22: The Value of Deeper Research
colon cancer
4.12: Reporting Births, Deaths, Diagnoses
communicable
5.1: Learning Outcomes
5.3: Classification of Diseases
communicable disease
4.1: Learning outcomes
5.5: Communicable Diseases
communicable diseases
4.4: Public Health Responses to Epidemics
5.18: Prevention of Communicable Diseases
5.19: Vaccination and how rates are changing in California
5.8: Modes of Transmission
communicable_diseases
5: The Prevention and Control of Diseases
communicableDiseases
1.13: World Health
communication
9.21: Culturally and Linguistically Appropriate Services (CLAS) Standards
community
3.11: Actions that work toward equality and health
3.4: Ecological Model and the Social Determinants
6.14: Lessons from Geese
8.10: Physical Activity
9.9.2: Becoming American- episode of Unnatural Causes
community assessment
6.4: Organizing steps in a campaign for change
community building
6.1: Learning Outcomes
6.4: Organizing steps in a campaign for change
community capacity
6.1: Learning Outcomes
community development
6.3: What Is Community Organizing?
6.5: Required Video Case Studies
community efforts
2.1: Learning Outcomes
community engagement
6.8: Why community organizing for public health?
9.19: Cultural Humility
community health
1.1: Student learning outcomes (goals) for this week
1.16: Summary
1.2: What Is Public Health?
1.4: Public Health and Medicine
1.5: Public Health and Personal Health
2.10: Example of Public Health Organizations Working Together
2.12: Core functions of state and local public health agencies and the 10 essential services
3.12: Making Changes to the Social Determinants Benefits Health
4: Epidemiology- The Study of Disease, Injury and Death in the Community
5.18: Prevention of Communicable Diseases
6.12: How to create a health promotion program
9: Community Health in Diverse Racial and Ethnic Populations Communities in the US
9.1: Goals for this Module (also known as learning outcomes)
community involvement
2.10: Example of Public Health Organizations Working Together
community needs
9.18: Cultural Competency
community organizations
3.10: Making Change
community organizing
6: Community Organizing, Community Building, and Health Promotion
6.1: Learning Outcomes
6.11: Health Promotion Programs
6.12: How to create a health promotion program
6.3: What Is Community Organizing?
6.4: Organizing steps in a campaign for change
6.5: Required Video Case Studies
6.8: Why community organizing for public health?
community participation
6.1: Learning Outcomes
community_health
3: Social Determinants of Health

communityhealth
1: Core Concepts and History of Public Health
1.3: Focus on Prevention
10.11.1: Social Ecological Model to Reduce LBW and Preterm Birth
2: Organizations of Public Health
2.5.1: Organization within a public health department
3.6: Social determinants have a major impact on health.
6.9: Applying the Roles of the CHW to a Case Study
7.3: What is environmental health
9.12: American Indians and Alaska Natives- Health overview and leading causes of death
9.15: Health Disparities in Specific Health Conditions
communityorganizing
6.6: More Examples of Organizing
6.7: Environmental Justice
6.9: Applying the Roles of the CHW to a Case Study
communityresilience
7.15: Preventing Climate Change and Adapting to Climate Change
conflict approaches
6.1: Learning Outcomes
consensus approaches
6.1: Learning Outcomes
consensus building
6.3: What Is Community Organizing?
control
5.16: Prevention, Intervention, Control, and Eradication of Diseases
controlmeasures
5.1: Learning Outcomes
coronary heart disease
8.5: ONE VIEW- Obesity - the most serious health problem of our day!
correlation
4.16: Causation
cortisol
3.7: Embodiment
county
3.1: Learning Outcomes
courseoutline
7.18: Additional Resources
covid_19
3: Social Determinants of Health
covid19
2: Organizations of Public Health
2.2: How Public Health Is Organized
2.9: Challenges within the Public Health System
3.6: Social determinants have a major impact on health.
4.11: Tracking the Spread of Covid-19
4.6: Public Health Statistics
9.22: Health Inequities in the Pandemic
9.23: What does a successful response look like?
covidresponse
6.6: More Examples of Organizing
CRAAP test
4.19: Health Information
critical thinking
4.22: The Value of Deeper Research
cultural beliefs
9.11: Asian Americans and Pacific Islanders- Health overview and leading causes of death
9.13: Immigrant and Refugee Health
Cultural competence
9.1: Goals for this Module (also known as learning outcomes)
9.17: And now... cultural competence and cultural humility
9.18: Cultural Competency
cultural competency
9: Community Health in Diverse Racial and Ethnic Populations Communities in the US
9.18: Cultural Competency
9.19: Cultural Humility
9.2: Chapter 10 in ICPH- Community and Public Health and Racial/Ethnic Populations
cultural humility
9.17: And now... cultural competence and cultural humility
9.19: Cultural Humility
cultural_practices
9.9: Americans of Hispanic Origin- Health overview and leading causes of death
culturalcompetence
9.21: Culturally and Linguistically Appropriate Services (CLAS) Standards
culture
9.12: American Indians and Alaska Natives- Health overview and leading causes of death
9.20: Cultural Barriers to Care
curiosity
4.22: The Value of Deeper Research

D

data analysis
4.14: Epidemiological Studies
dataanalysis
4.13: Secondary Data
4.2: Epidemiology and Public Health
death rate
4.10: Morbidity and Mortality
Delta variant
5.5: Communicable Diseases
demographic data
9.8: Snapshots of the Health of Racial and Ethnic Groups in the US
demographic trends
9.6: Racial and Ethnic Classifications
demographics
9.10: African Americans- Health overview and leading causes of death
dengue fever
5.8: Modes of Transmission
determinants of health
3.2: What are "social determinants of health?"
developed countries
3.8: Inequality Itself Correlates to Worse Health
diabetes
8.7: A DIFFERENT VIEW- Obesity - a manifestation of fat-phobia and a distraction from the real issues!
9.15: Health Disparities in Specific Health Conditions
diabetes management
5.16: Prevention, Intervention, Control, and Eradication of Diseases
diabetes mellitus
5.12: Noncommunicable Diseases
diet
1.5: Public Health and Personal Health
2.13: Public Health Involves Making Public Policy for the Public Good
7.16: Co-Benefits of Taking Steps to Address Climate Change
8.8: What causes obesity? What causes the diseases associated with obesity?
8.9: What is good nutrition?
9.9: Americans of Hispanic Origin- Health overview and leading causes of death
diet industry
8.7: A DIFFERENT VIEW- Obesity - a manifestation of fat-phobia and a distraction from the real issues!
dieting
8.3: Regarding obesity, we have at least two controversies
discrimination
3.4: Ecological Model and the Social Determinants
8: Weight, weight bias, nutrition and physical activity
8.2: Obesity- A controversy
9.9.2: Becoming American- episode of Unnatural Causes
disease
4: Epidemiology- The Study of Disease, Injury and Death in the Community
4.12: Reporting Births, Deaths, Diagnoses
4.16: Causation
4.18: Risk Factors and Protective Factors
5.1: Learning Outcomes
5.13: Multi-Causation Models of Disease
5.14: The Multi-Causation Model and the Ecological Model
disease management
5.16: Prevention, Intervention, Control, and Eradication of Diseases
disease outbreaks
5.8: Modes of Transmission
disease prevention
1.2: What Is Public Health?
5.17: Levels of Prevention
disease spread
5.8: Modes of Transmission
diseaseprevention
2.9: Challenges within the Public Health System
diseases
1.9: Public Health Early History
4.2: Epidemiology and Public Health
4.6: Public Health Statistics
4.9: Cases and Rates
5.15: Prioritizing Prevention and Control Efforts
5.3: Classification of Diseases
disparities
9.14: Minority Health and Health Inequities (disparities)
9.7: Issues with Data and with the Classifications
distrust
9.10: African Americans- Health overview and leading causes of death
diverse populations
9.18: Cultural Competency

diversity
- 9: Community Health in Diverse Racial and Ethnic Populations Communities in the US
- 9.1: Goals for this Module (also known as learning outcomes)
- 9.11: Asian Americans and Pacific Islanders- Health overview and leading causes of death
- 9.17: And now... cultural competence and cultural humility
- 9.6: Racial and Ethnic Classifications
- 9.9: Americans of Hispanic Origin- Health overview and leading causes of death

documentary
- 3.5: UNNATURAL CAUSES- In Sickness and In Wealth
- 6.6: More Examples of Organizing

downstream
- 1.3: Focus on Prevention

Dr. Melanie Tervalon
- 9.19: Cultural Humility

drinkingWater
- 1.13: World Health

dyslipidemia
- 8.5: ONE VIEW- Obesity - the most serious health problem of our day!

E

ecological model
- 2.10: Example of Public Health Organizations Working Together

ecology
- 3.4: Ecological Model and the Social Determinants

economic instability
- 3.4: Ecological Model and the Social Determinants

economic justice
- 3.12: Making Changes to the Social Determinants Benefits Health

economic policy
- 3.10: Making Change
- 3.11: Actions that work toward equality and health

economic security
- 10.8.3: Life Course Perspective

economicmobility
- 9.9.2: Becoming American- episode of Unnatural Causes

education
- 1.15: Additional Resources
- 10.8.4: California- A Partial Success Story in Saving Mothers' Lives
- 3.9: Inequality in the United States
- 5.20: Examples of Prevention of Noncommunicable Diseases using the 3 levels of prevention
- 8.2: Obesity- A controversy
- 9.10: African Americans- Health overview and leading causes of death
- 9.11: Asian Americans and Pacific Islanders- Health overview and leading causes of death
- 9.16: Social Determinants of Health and Racial and Ethnic Disparities in Health

education access
- 3.10: Making Change

education policy
- 3.11: Actions that work toward equality and health

effective communication
- 9.18: Cultural Competency

EJ
- 6.7: Environmental Justice

embodiment
- 3.7: Embodiment

emissions reduction
- 7.12: Climate Change and Environmental Health

empowered community
- 6.1: Learning Outcomes

empowering
- 6.9: Applying the Roles of the CHW to a Case Study

empowerment
- 6: Community Organizing, Community Building, and Health Promotion
- 6.3: What Is Community Organizing?
- 6.5: Required Video Case Studies
- 6.8: Why community organizing for public health?
- 9.2: Chapter 10 in ICPH- Community and Public Health and Racial/Ethnic Populations

encouragement
- 6.14: Lessons from Geese

endemic
- 4.1: Learning outcomes

environment
- 1.6: Factors that Contribute to Health
- 5.13: Multi-Causation Models of Disease
- 5.14: The Multi-Causation Model and the Ecological Model

environmental changes
- 6.11: Health Promotion Programs

environmental health
- 1.2: What Is Public Health?
- 7: Environmental Health
- 7.2: Learning Outcomes
- 7.5: Measuring Risk

environmental justice
- 6: Community Organizing, Community Building, and Health Promotion
- 7.12: Climate Change and Environmental Health

environmental protection
- 7.6: Laws to Protect the Environment and Human Health

Environmental Protection Agency
- 7.5: Measuring Risk

environmentalhazards
- 6.7: Environmental Justice
- 7.3: What is environmental health

environmentalhealth
- 1.8.1: The Social Ecological Model- Breast Cancer example
- 2.5.1: Organization within a public health department
- 6.7: Environmental Justice
- 7.15: Preventing Climate Change and Adapting to Climate Change
- 7.3: What is environmental health
- 7.4: Environmental Health and the Emergence of the Modern Environmental Movement

EnvironmentalJustice
- 6.6: More Examples of Organizing
- 6.7: Environmental Justice

EnvironmentalRacism
- 6.7: Environmental Justice

EPA
- 7: Environmental Health
- 7.2: Learning Outcomes
- 7.4: Environmental Health and the Emergence of the Modern Environmental Movement
- 7.6: Laws to Protect the Environment and Human Health

epidemic
- 4.1: Learning outcomes

epidemic response
- 4.4: Public Health Responses to Epidemics

epidemiological triangle
- 5.14: The Multi-Causation Model and the Ecological Model

epidemiology
- 1.9: Public Health Early History
- 2.5.1: Organization within a public health department
- 4: Epidemiology- The Study of Disease, Injury and Death in the Community
- 4.1: Learning outcomes
- 4.11: Tracking the Spread of Covid-19
- 4.13: Secondary Data
- 4.14: Epidemiological Studies
- 4.18: Risk Factors and Protective Factors
- 4.2: Epidemiology and Public Health
- 4.4: Public Health Responses to Epidemics
- 4.6: Public Health Statistics
- 4.9: Cases and Rates
- 5: The Prevention and Control of Diseases
- 5.1: Learning Outcomes
- 5.18: Prevention of Communicable Diseases
- 5.2: The Public Health Approach

epigenetics
- 8.8: What causes obesity? What causes the diseases associated with obesity?

equity
- 3.11: Actions that work toward equality and health
- 3.13: Change Can Happen
- 9.21: Culturally and Linguistically Appropriate Services (CLAS) Standards

essential services
- 1.16: Summary

ethnic communities
- 9.23: What does a successful response look like?

ethnic groups
- 9.13: Immigrant and Refugee Health
- 9.2: Chapter 10 in ICPH- Community and Public Health and Racial/Ethnic Populations
- 9.6: Racial and Ethnic Classifications

ethnic minorities
- 9.14: Minority Health and Health Inequities (disparities)

ethnic populations
- 9.17: And now... cultural competence and cultural humility

ethnicity
- 9.16: Social Determinants of Health and Racial and Ethnic Disparities in Health
- 9.6: Racial and Ethnic Classifications
- 9.7: Issues with Data and with the Classifications
- 9.8: Snapshots of the Health of Racial and Ethnic Groups in the US

etiology
- 5.13: Multi-Causation Models of Disease

evaluation
- 6.12: How to create a health promotion program
- 6.4: Organizing steps in a campaign for change

evidence
- 3.1: Learning Outcomes

exercise
2.13: Public Health Involves Making Public Policy for the Public Good
8.10: Physical Activity
8.7: A DIFFERENT VIEW- Obesity - a manifestation of fat-phobia and a distraction from the real issues!
experimental studies
4.14: Epidemiological Studies
exposure
5.14: The Multi-Causation Model and the Ecological Model
extreme weather
7.12: Climate Change and Environmental Health

F

family engagement
2.10: Example of Public Health Organizations Working Together
family_ties
9.9: Americans of Hispanic Origin- Health overview and leading causes of death
fatality rate
4.10: Morbidity and Mortality
FDA
7.4: Environmental Health and the Emergence of the Modern Environmental Movement
FirstNations
9.12: American Indians and Alaska Natives- Health overview and leading causes of death
fitness
8: Weight, weight bias, nutrition and physical activity
8.10: Physical Activity
8.3: Regarding obesity, we have at least two controversies
Flint
7.18: Additional Resources
flying formation
6.14: Lessons from Geese
food
8.9: What is good nutrition?
food safety
1.2: What Is Public Health?
foodsecurity
1: Core Concepts and History of Public Health
fruits
8.9: What is good nutrition?
function
1.15: Additional Resources
fungi
5.6: Types of Infectious Agents

G

geese
6.14: Lessons from Geese
genetic counseling
5.4: Genetic Diseases
genetic diseases
5.4: Genetic Diseases
genetics
1.6: Factors that Contribute to Health
5.13: Multi-Causation Models of Disease
5.4: Genetic Diseases
8.8: What causes obesity? What causes the diseases associated with obesity?
germtheory
1.9: Public Health Early History
global health
1.2: What Is Public Health?
global health trends
9.1: Goals for this Module (also known as learning outcomes)
globalhealth
1.13: World Health
goal setting
6.4: Organizing steps in a campaign for change
goals
1.1: Student learning outcomes (goals) for this week
government
2.2: How Public Health Is Organized
grassroots movements
6.8: Why community organizing for public health?
grassroots organizing
6: Community Organizing, Community Building, and Health Promotion
greenhouse gasses
7.12: Climate Change and Environmental Health

H

Harm Reduction
5.18: Prevention of Communicable Diseases
hazards
7.5: Measuring Risk
health
1.12: Twenty-First Century Public Health
1.16: Summary
1.6: Factors that Contribute to Health
2.13: Public Health Involves Making Public Policy for the Public Good
3.1: Learning Outcomes
3.11: Actions that work toward equality and health
3.13: Change Can Happen
3.3: Healthy People 2030 and the Social Determinants of Health
3.5: UNNATURAL CAUSES- In Sickness and In Wealth
3.6: Social determinants have a major impact on health.
3.8: Inequality Itself Correlates to Worse Health
3.9: Inequality in the United States
4.12: Reporting Births, Deaths, Diagnoses
4.16: Causation
4.19: Health Information
4.9: Cases and Rates
5.13: Multi-Causation Models of Disease
5.14: The Multi-Causation Model and the Ecological Model
5.15: Prioritizing Prevention and Control Efforts
5.20: Examples of Prevention of Noncommunicable Diseases using the 3 levels of prevention
5.3: Classification of Diseases
6.3: What Is Community Organizing?
6.5: Required Video Case Studies
7.16: Co-Benefits of Taking Steps to Address Climate Change
8: Weight, weight bias, nutrition and physical activity
8.10: Physical Activity
8.2: Obesity- A controversy
8.3: Regarding obesity, we have at least two controversies
8.7: A DIFFERENT VIEW- Obesity - a manifestation of fat-phobia and a distraction from the real issues!
8.9: What is good nutrition?
9.10: African Americans- Health overview and leading causes of death
9.11: Asian Americans and Pacific Islanders- Health overview and leading causes of death
9.12: American Indians and Alaska Natives- Health overview and leading causes of death
9.14: Minority Health and Health Inequities (disparities)
9.20: Cultural Barriers to Care
9.22: Health Inequities in the Pandemic
9.9: Americans of Hispanic Origin- Health overview and leading causes of death
health advocacy
1.4: Public Health and Medicine
health agencies
1.16: Summary
health behavior
4.18: Risk Factors and Protective Factors
health behaviors
1.12: Twenty-First Century Public Health
2.1: Learning Outcomes
2.10: Example of Public Health Organizations Working Together
health benefits
3.4: Ecological Model and the Social Determinants
health care
9.14: Minority Health and Health Inequities (disparities)
health data
9.7: Issues with Data and with the Classifications

health departments
2.12: Core functions of state and local public health agencies and the 10 essential services
health disparities
1.12: Twenty-First Century Public Health
2.1: Learning Outcomes
3.11: Actions that work toward equality and health
3.2: What are "social determinants of health?"
3.3: Healthy People 2030 and the Social Determinants of Health
3.5: UNNATURAL CAUSES- In Sickness and In Wealth
3.9: Inequality in the United States
9: Community Health in Diverse Racial and Ethnic Populations Communities in the US
9.13: Immigrant and Refugee Health
9.2: Chapter 10 in ICPH- Community and Public Health and Racial/Ethnic Populations
9.6: Racial and Ethnic Classifications
health education
1.4: Public Health and Medicine
1.5: Public Health and Personal Health
4.4: Public Health Responses to Epidemics
5.17: Levels of Prevention
6: Community Organizing, Community Building, and Health Promotion
6.11: Health Promotion Programs
9.18: Cultural Competency
health equity
1.10: Twentieth Century Public Health
2.1: Learning Outcomes
3.10: Making Change
3.2: What are "social determinants of health?"
3.3: Healthy People 2030 and the Social Determinants of Health
5.4: Genetic Diseases
6: Community Organizing, Community Building, and Health Promotion
9: Community Health in Diverse Racial and Ethnic Populations Communities in the US
9.14: Minority Health and Health Inequities (disparities)
9.7: Issues with Data and with the Classifications
health hazards
7: Environmental Health
health inequalities
2.1: Learning Outcomes
3.10: Making Change
4.12: Reporting Births, Deaths, Diagnoses
health inequities
10.8.4: California- A Partial Success Story in Saving Mothers' Lives
3.12: Making Changes to the Social Determinants Benefits Health
8.4: Americans have gained weight
9.1: Goals for this Module (also known as learning outcomes)
9.22: Health Inequities in the Pandemic
9.23: What does a successful response look like?
health information
4.1: Learning outcomes
9.16: Social Determinants of Health and Racial and Ethnic Disparities in Health
health institutions
1.1: Student learning outcomes (goals) for this week
health interventions
3.3: Healthy People 2030 and the Social Determinants of Health
health literacy
3.3: Healthy People 2030 and the Social Determinants of Health
health measures
5.17: Levels of Prevention
health monitoring
4: Epidemiology- The Study of Disease, Injury and Death in the Community
health outcomes
1.4: Public Health and Medicine
10.8.3: Life Course Perspective
3.2: What are "social determinants of health?"
3.9: Inequality in the United States
8.2: Obesity- A controversy
9.1: Goals for this Module (also known as learning outcomes)
9.16: Social Determinants of Health and Racial and Ethnic Disparities in Health
health policies
2.10: Example of Public Health Organizations Working Together
health policy
1.2: What Is Public Health?
9.14: Minority Health and Health Inequities (disparities)
health prevention
1.5: Public Health and Personal Health
health problems
5.3: Classification of Diseases
health promotion
1.10: Twentieth Century Public Health
1.2: What Is Public Health?
2.13: Public Health Involves Making Public Policy for the Public Good
5.16: Prevention, Intervention, Control, and Eradication of Diseases
6: Community Organizing, Community Building, and Health Promotion
6.11: Health Promotion Programs
6.12: How to create a health promotion program
9.18: Cultural Competency
health research
1.2: What Is Public Health?
4.14: Epidemiological Studies
4.22: The Value of Deeper Research
9.2: Chapter 10 in ICPH- Community and Public Health and Racial/Ethnic Populations
health risks
8.3: Regarding obesity, we have at least two controversies
8.5: ONE VIEW- Obesity - the most serious health problem of our day!
health statistics
4.10: Morbidity and Mortality
health status
9.2: Chapter 10 in ICPH- Community and Public Health and Racial/Ethnic Populations
9.8: Snapshots of the Health of Racial and Ethnic Groups in the US
health strategies
6.11: Health Promotion Programs
health transformation
6.8: Why community organizing for public health?
health_disparities
3: Social Determinants of Health
5: The Prevention and Control of Diseases
health_equity
3: Social Determinants of Health
5: The Prevention and Control of Diseases
health_inequities
3: Social Determinants of Health
health_outcomes
3: Social Determinants of Health
healthagencies
2.2: How Public Health Is Organized
healthandwellbeing
7.3: What is environmental health
healthcare
1: Core Concepts and History of Public Health
1.12: Twenty-First Century Public Health
1.3: Focus on Prevention
1.4: Public Health and Medicine
1.6: Factors that Contribute to Health
4.12: Reporting Births, Deaths, Diagnoses
5.12: Noncommunicable Diseases
5.13: Multi-Causation Models of Disease
5.15: Prioritizing Prevention and Control Efforts
5.2: The Public Health Approach
9.12: American Indians and Alaska Natives- Health overview and leading causes of death
9.21: Culturally and Linguistically Appropriate Services (CLAS) Standards
healthcare access
1.10: Twentieth Century Public Health
3.12: Making Changes to the Social Determinants Benefits Health
9: Community Health in Diverse Racial and Ethnic Populations Communities in the US
healthcare providers
10.8.4: California- A Partial Success Story in Saving Mothers' Lives
healthcare reform
2.12: Core functions of state and local public health agencies and the 10 essential services
healthcare systems
9.18: Cultural Competency
healthcareaccess
1.8.1: The Social Ecological Model- Breast Cancer example
healthcareworkers
2.9: Challenges within the Public Health System
healthchallenges
1.13: World Health
healthdata
4.6: Public Health Statistics
healthdisparities
10.11.1: Social Ecological Model to Reduce LBW and Preterm Birth
2: Organizations of Public Health
3.6: Social determinants have a major impact on health.
3.7: Embodiment
9.10: African Americans- Health overview and leading causes of death
9.15: Health Disparities in Specific Health Conditions
HealthEducation
2.5.1: Organization within a public health department
HealthEquities
6.7: Environmental Justice
healthimpacts
8.1: Learning Outcomes (goals for this module)
healthindicators
4.2: Epidemiology and Public Health
healthinequities
1.8.1: The Social Ecological Model- Breast Cancer example
1.9: Public Health Early History
2: Organizations of Public Health
2.9: Challenges within the Public Health System
3.1: Learning Outcomes
healthinterventions
4.2: Epidemiology and Public Health

healthissues
- 9.15: Health Disparities in Specific Health Conditions

healthliteracy
- 9.21: Culturally and Linguistically Appropriate Services (CLAS) Standards

healthoutcome
- 4.6: Public Health Statistics

healthoutcomes
- 3.1: Learning Outcomes
- 3.6: Social determinants have a major impact on health.
- 7.3: What is environmental health
- 9.9.2: Becoming American- episode of Unnatural Causes

healthpolicies
- 1.8.1: The Social Ecological Model- Breast Cancer example

healthpolicy
- 1: Core Concepts and History of Public Health
- 1.3: Focus on Prevention
- 2: Organizations of Public Health

healthpromotion
- 1: Core Concepts and History of Public Health
- 1.3: Focus on Prevention
- 6.9: Applying the Roles of the CHW to a Case Study

healthresearch
- 3.6: Social determinants have a major impact on health.

healthrisks
- 7.15: Preventing Climate Change and Adapting to Climate Change
- 7.3: What is environmental health
- 7.4: Environmental Health and the Emergence of the Modern Environmental Movement

healthservices
- 2: Organizations of Public Health

healthstatistics
- 5.2: The Public Health Approach
- 6.6: More Examples of Organizing

healthsurveys
- 4.13: Secondary Data

healthy lifestyle
- 5.20: Examples of Prevention of Noncommunicable Diseases using the 3 levels of prevention

Healthy People 2030
- 2.1: Learning Outcomes
- 3.3: Healthy People 2030 and the Social Determinants of Health

heart disease
- 5.12: Noncommunicable Diseases
- 5.15: Prioritizing Prevention and Control Efforts
- 5.20: Examples of Prevention of Noncommunicable Diseases using the 3 levels of prevention
- 8.7: A DIFFERENT VIEW- Obesity - a manifestation of fat-phobia and a distraction from the real issues!

heartdisease
- 1.3: Focus on Prevention
- 9.10: African Americans- Health overview and leading causes of death

herd immunity
- 5.19: Vaccination and how rates are changing in California

hispanic
- 9.9: Americans of Hispanic Origin- Health overview and leading causes of death

history
- 1.9: Public Health Early History

HIV
- 5.18: Prevention of Communicable Diseases

HIV/AIDS
- 9.15: Health Disparities in Specific Health Conditions

hospital procedures
- 9.20: Cultural Barriers to Care

housing insecurity
- 9.22: Health Inequities in the Pandemic

human health
- 7.12: Climate Change and Environmental Health

hypertension
- 8.5: ONE VIEW- Obesity - the most serious health problem of our day!

I

IFR
- 4.11: Tracking the Spread of Covid-19

immigrant health
- 9: Community Health in Diverse Racial and Ethnic Populations Communities in the US
- 9.8: Snapshots of the Health of Racial and Ethnic Groups in the US

immigrant rights
- 9.13: Immigrant and Refugee Health

immigranthealth
- 9.9.2: Becoming American- episode of Unnatural Causes

immigrantparadox
- 9.9.2: Becoming American- episode of Unnatural Causes

immigrants
- 9.22: Health Inequities in the Pandemic

immigration
- 9.11: Asian Americans and Pacific Islanders- Health overview and leading causes of death
- 9.13: Immigrant and Refugee Health
- 9.7: Issues with Data and with the Classifications
- 9.9: Americans of Hispanic Origin- Health overview and leading causes of death

immunefunction
- 8.1: Learning Outcomes (goals for this module)

immuneSystem
- 3.7: Embodiment

immunity
- 5.19: Vaccination and how rates are changing in California
- 5.6: Types of Infectious Agents

immunization
- 4.4: Public Health Responses to Epidemics

immunizationrates
- 9.15: Health Disparities in Specific Health Conditions

immunizations
- 5.19: Vaccination and how rates are changing in California

implicit bias
- 10.8.4: California- A Partial Success Story in Saving Mothers' Lives

improvement
- 9.21: Culturally and Linguistically Appropriate Services (CLAS) Standards

incidence
- 4.1: Learning outcomes
- 4.10: Morbidity and Mortality

income
- 3.5: UNNATURAL CAUSES- In Sickness and In Wealth
- 3.8: Inequality Itself Correlates to Worse Health
- 3.9: Inequality in the United States
- 9.16: Social Determinants of Health and Racial and Ethnic Disparities in Health

income disparity
- 8.4: Americans have gained weight

Income Inequality
- 3.10: Making Change
- 3.13: Change Can Happen
- 3.2: What are "social determinants of health?"

income_inequality
- 3: Social Determinants of Health

individual
- 3.4: Ecological Model and the Social Determinants

inequality
- 3.1: Learning Outcomes
- 3.5: UNNATURAL CAUSES- In Sickness and In Wealth
- 3.6: Social determinants have a major impact on health.
- 3.7: Embodiment
- 3.8: Inequality Itself Correlates to Worse Health
- 3.9: Inequality in the United States

inequities
- 9.14: Minority Health and Health Inequities (disparities)

infanthealth
- 10.11.1: Social Ecological Model to Reduce LBW and Preterm Birth

infantmortality
- 9.15: Health Disparities in Specific Health Conditions

infection control
- 5.18: Prevention of Communicable Diseases

infection fatality rate
- 4.11: Tracking the Spread of Covid-19

Infectious
- 5.1: Learning Outcomes
- 5.3: Classification of Diseases

infectious agents
- 5.5: Communicable Diseases
- 5.8: Modes of Transmission

infectious diseases
- 1.12: Twenty-First Century Public Health
- 4.4: Public Health Responses to Epidemics
- 5.18: Prevention of Communicable Diseases

infectiousdiseases
- 2.5.1: Organization within a public health department
- 5.6: Types of Infectious Agents

infectivity
- 5.5: Communicable Diseases

inflammation
- 8.8: What causes obesity? What causes the diseases associated with obesity?

influenza
- 5.8: Modes of Transmission

information
- 4.19: Health Information

information literacy
- 4.22: The Value of Deeper Research

injury
- 4: Epidemiology- The Study of Disease, Injury and Death in the Community

institutional accountability
9.19: Cultural Humility
insurance practices
9.20: Cultural Barriers to Care
integrated care
1.4: Public Health and Medicine
interdependence
6.14: Lessons from Geese
internationalhealth
2.2: How Public Health Is Organized
intervention
5.16: Prevention, Intervention, Control, and Eradication of Diseases
6.12: How to create a health promotion program

J

job loss
9.22: Health Inequities in the Pandemic
John Snow
4.4: Public Health Responses to Epidemics

L

latino
9.23: What does a successful response look like?
9.9: Americans of Hispanic Origin- Health overview and leading causes of death
LatinoHealthAccess
6.9: Applying the Roles of the CHW to a Case Study
LatinoParadox
9.9.2: Becoming American- episode of Unnatural Causes
leadership
6.14: Lessons from Geese
9.21: Culturally and Linguistically Appropriate Services (CLAS) Standards
leadingCausesOfDeath
9.10: African Americans- Health overview and leading causes of death
9.12: American Indians and Alaska Natives- Health overview and leading causes of death
leadpoisoning
7.18: Additional Resources
learning
1.1: Student learning outcomes (goals) for this week
legislation
7: Environmental Health
lessons
6.14: Lessons from Geese
library
4.19: Health Information
life course perspective
10.8.3: Life Course Perspective
life expectancy
3.10: Making Change
4.12: Reporting Births, Deaths, Diagnoses
8.7: A DIFFERENT VIEW- Obesity - a manifestation of fat-phobia and a distraction from the real issues!
lifeExpectancy
1.13: World Health
lifelong learning
9.19: Cultural Humility
lifestyle
1.6: Factors that Contribute to Health
lifestyle diseases
1.12: Twenty-First Century Public Health
liver disease
8.5: ONE VIEW- Obesity - the most serious health problem of our day!
Long Beach
6.5: Required Video Case Studies
Los Angeles
6.5: Required Video Case Studies
low birth weight
10.8.3: Life Course Perspective
lowbirthweight
10.11.1: Social Ecological Model to Reduce LBW and Preterm Birth
lung cancer
4.16: Causation
4.18: Risk Factors and Protective Factors

M

majority
9.6: Racial and Ethnic Classifications
malaria
5.8: Modes of Transmission
marketing
2.13: Public Health Involves Making Public Policy for the Public Good
maternal health outcomes
10.8.4: California- A Partial Success Story in Saving Mothers' Lives
maternal mortality
10.8.4: California- A Partial Success Story in Saving Mothers' Lives
MaternalAndChildHealth
2.5.1: Organization within a public health department
maternalhealth
10.11.1: Social Ecological Model to Reduce LBW and Preterm Birth
measles
5.19: Vaccination and how rates are changing in California
Medicaid
1.10: Twentieth Century Public Health
medical
9.20: Cultural Barriers to Care
medical education
9.19: Cultural Humility
Medicare
1.10: Twentieth Century Public Health
medications
7.5: Measuring Risk
medicine
1.16: Summary
Mental health
1.2: What Is Public Health?
1.5: Public Health and Personal Health
3.13: Change Can Happen
3.9: Inequality in the United States
7.12: Climate Change and Environmental Health
8.10: Physical Activity
8.2: Obesity- A controversy
9.22: Health Inequities in the Pandemic
mentalhealth
7.16: Co-Benefits of Taking Steps to Address Climate Change
8.1: Learning Outcomes (goals for this module)
microbiology
5.4: Genetic Diseases
migration
1.13: World Health
minimumwage
6.6: More Examples of Organizing
minority
9.6: Racial and Ethnic Classifications
minority groups
9.8: Snapshots of the Health of Racial and Ethnic Groups in the US
minority health
9.1: Goals for this Module (also known as learning outcomes)
mitigation
7.16: Co-Benefits of Taking Steps to Address Climate Change
monitoring
4.9: Cases and Rates
Morbidity
4: Epidemiology- The Study of Disease, Injury and Death in the Community
4.10: Morbidity and Mortality
4.13: Secondary Data
Mortality
4: Epidemiology- The Study of Disease, Injury and Death in the Community
4.12: Reporting Births, Deaths, Diagnoses
4.13: Secondary Data
4.9: Cases and Rates
5.15: Prioritizing Prevention and Control Efforts
mortality rate
4.1: Learning outcomes
4.10: Morbidity and Mortality
mpox
2.9: Challenges within the Public Health System
MyPlate
8.9: What is good nutrition?

N

Native American
9.20: Cultural Barriers to Care
native americans
9.23: What does a successful response look like?
NativeAmericans
9.12: American Indians and Alaska Natives- Health overview and leading causes of death
needs assessment
6.12: How to create a health promotion program
neighborhood
3.1: Learning Outcomes
NewYorkCity
1.15: Additional Resources
noncommunicable
5.13: Multi-Causation Models of Disease
5.3: Classification of Diseases
noncommunicable diseases
5.12: Noncommunicable Diseases
5.20: Examples of Prevention of Noncommunicable Diseases using the 3 levels of prevention
5.4: Genetic Diseases
noncommunicable_diseases
5: The Prevention and Control of Diseases

nutrition
- 1.6: Factors that Contribute to Health
- 2.5.1: Organization within a public health department
- 3.13: Change Can Happen
- 4.2: Epidemiology and Public Health
- 8: Weight, weight bias, nutrition and physical activity
- 8.1: Learning Outcomes (goals for this module)
- 8.2: Obesity- A controversy
- 8.3: Regarding obesity, we have at least two controversies
- 8.7: A DIFFERENT VIEW- Obesity - a manifestation of fat-phobia and a distraction from the real issues!
- 8.9: What is good nutrition?

O

Oakland
- 6.5: Required Video Case Studies

obesity
- 7.16: Co-Benefits of Taking Steps to Address Climate Change
- 8: Weight, weight bias, nutrition and physical activity
- 8.1: Learning Outcomes (goals for this module)
- 8.10: Physical Activity
- 8.2: Obesity- A controversy
- 8.3: Regarding obesity, we have at least two controversies
- 8.4: Americans have gained weight
- 8.5: ONE VIEW- Obesity - the most serious health problem of our day!
- 8.7: A DIFFERENT VIEW- Obesity - a manifestation of fat-phobia and a distraction from the real issues!
- 8.8: What causes obesity? What causes the diseases associated with obesity?

observational studies
- 4.14: Epidemiological Studies

occupationalhealth
- 7.3: What is environmental health

Omicron variant
- 5.5: Communicable Diseases

opinion formation
- 4.22: The Value of Deeper Research

optimism
- 9.16: Social Determinants of Health and Racial and Ethnic Disparities in Health

outbreak
- 5.1: Learning Outcomes

outbreak analysis
- 4.14: Epidemiological Studies

outbreak investigation
- 2.12: Core functions of state and local public health agencies and the 10 essential services

outbreak prevention
- 5.16: Prevention, Intervention, Control, and Eradication of Diseases

outbreak_management
- 5: The Prevention and Control of Diseases

outbreaks
- 4: Epidemiology- The Study of Disease, Injury and Death in the Community

outcomes
- 1.1: Student learning outcomes (goals) for this week

overview
- 1.15: Additional Resources

overweight
- 8.1: Learning Outcomes (goals for this module)
- 8.4: Americans have gained weight

P

Pacific Islanders
- 9.11: Asian Americans and Pacific Islanders- Health overview and leading causes of death

pandemic
- 1.13: World Health
- 2.9: Challenges within the Public Health System
- 4.1: Learning outcomes
- 4.4: Public Health Responses to Epidemics
- 9.17: And now... cultural competence and cultural humility
- 9.22: Health Inequities in the Pandemic

parasites
- 5.6: Types of Infectious Agents

participation
- 6.8: Why community organizing for public health?

pathogen
- 5.6: Types of Infectious Agents

pathogenicity
- 5.5: Communicable Diseases

patient care
- 9.20: Cultural Barriers to Care

personal behaviors
- 2.13: Public Health Involves Making Public Policy for the Public Good

personal health
- 1.5: Public Health and Personal Health

pesticides
- 7.4: Environmental Health and the Emergence of the Modern Environmental Movement

pharmaceuticals
- 8.8: What causes obesity? What causes the diseases associated with obesity?

physical activity
- 1.5: Public Health and Personal Health
- 8: Weight, weight bias, nutrition and physical activity
- 8.10: Physical Activity
- 8.2: Obesity- A controversy
- 8.3: Regarding obesity, we have at least two controversies

physical_activity
- 8.8: What causes obesity? What causes the diseases associated with obesity?

physicalactivity
- 8.1: Learning Outcomes (goals for this module)

planning and policy practice
- 6.1: Learning Outcomes

podcast
- 9.23: What does a successful response look like?

policy changes
- 6.11: Health Promotion Programs

policy development
- 1.1: Student learning outcomes (goals) for this week
- 2.12: Core functions of state and local public health agencies and the 10 essential services

policy_change
- 3: Social Determinants of Health

pollution
- 6.7: Environmental Justice
- 7: Environmental Health
- 7.2: Learning Outcomes
- 7.3: What is environmental health
- 7.6: Laws to Protect the Environment and Human Health

population health
- 1.1: Student learning outcomes (goals) for this week
- 1.5: Public Health and Personal Health
- 3.3: Healthy People 2030 and the Social Determinants of Health
- 4.10: Morbidity and Mortality

populationhealth
- 4.2: Epidemiology and Public Health
- 4.6: Public Health Statistics
- 5.2: The Public Health Approach

populations
- 1.16: Summary
- 2.12: Core functions of state and local public health agencies and the 10 essential services
- 3.1: Learning Outcomes

poverty
- 3.13: Change Can Happen
- 9.9.2: Becoming American- episode of Unnatural Causes

pregnancy
- 10.11.1: Social Ecological Model to Reduce LBW and Preterm Birth

prenatalcare
- 10.11.1: Social Ecological Model to Reduce LBW and Preterm Birth

prevalence
- 4.1: Learning outcomes
- 4.10: Morbidity and Mortality

prevention
- 1: Core Concepts and History of Public Health
- 1.16: Summary
- 1.3: Focus on Prevention
- 1.4: Public Health and Medicine
- 10.8.3: Life Course Perspective
- 2: Organizations of Public Health
- 2.12: Core functions of state and local public health agencies and the 10 essential services
- 4.9: Cases and Rates
- 5: The Prevention and Control of Diseases
- 5.1: Learning Outcomes
- 5.12: Noncommunicable Diseases
- 5.15: Prioritizing Prevention and Control Efforts
- 5.16: Prevention, Intervention, Control, and Eradication of Diseases
- 5.17: Levels of Prevention
- 5.18: Prevention of Communicable Diseases
- 5.2: The Public Health Approach
- 5.20: Examples of Prevention of Noncommunicable Diseases using the 3 levels of prevention
- 5.4: Genetic Diseases
- 6.3: What Is Community Organizing?
- 7.15: Preventing Climate Change and Adapting to Climate Change

prevention efforts
- 5.14: The Multi-Causation Model and the Ecological Model

prevention strategy
- 4.18: Risk Factors and Protective Factors

primary prevention
- 5.17: Levels of Prevention
- 5.20: Examples of Prevention of Noncommunicable Diseases using the 3 levels of prevention

problem recognition
- 6.4: Organizing steps in a campaign for change

Protective factor
4.18: Risk Factors and Protective Factors
protectivefactors
5.2: The Public Health Approach
protein
8.9: What is good nutrition?
providers
9.20: Cultural Barriers to Care
public health
1.1: Student learning outcomes (goals) for this week
1.10: Twentieth Century Public Health
1.12: Twenty-First Century Public Health
1.16: Summary
1.2: What Is Public Health?
1.4: Public Health and Medicine
1.5: Public Health and Personal Health
1.6: Factors that Contribute to Health
10.8.4: California- A Partial Success Story in Saving Mothers' Lives
2.1: Learning Outcomes
2.10: Example of Public Health Organizations Working Together
2.12: Core functions of state and local public health agencies and the 10 essential services
2.13: Public Health Involves Making Public Policy for the Public Good
3.10: Making Change
3.11: Actions that work toward equality and health
3.2: What are "social determinants of health?"
3.3: Healthy People 2030 and the Social Determinants of Health
3.9: Inequality in the United States
4: Epidemiology- The Study of Disease, Injury and Death in the Community
4.12: Reporting Births, Deaths, Diagnoses
4.14: Epidemiological Studies
4.18: Risk Factors and Protective Factors
4.19: Health Information
4.4: Public Health Responses to Epidemics
5.12: Noncommunicable Diseases
5.15: Prioritizing Prevention and Control Efforts
5.16: Prevention, Intervention, Control, and Eradication of Diseases
5.17: Levels of Prevention
5.18: Prevention of Communicable Diseases
5.19: Vaccination and how rates are changing in California
5.4: Genetic Diseases
5.5: Communicable Diseases
5.8: Modes of Transmission
6: Community Organizing, Community Building, and Health Promotion
6.11: Health Promotion Programs
6.12: How to create a health promotion program
6.3: What Is Community Organizing?
6.5: Required Video Case Studies
6.8: Why community organizing for public health?
7: Environmental Health
7.2: Learning Outcomes
7.5: Measuring Risk
7.6: Laws to Protect the Environment and Human Health
8: Weight, weight bias, nutrition and physical activity
8.10: Physical Activity
8.2: Obesity- A controversy
9: Community Health in Diverse Racial and Ethnic Populations Communities in the US
9.1: Goals for this Module (also known as learning outcomes)
9.13: Immigrant and Refugee Health
9.14: Minority Health and Health Inequities (disparities)
9.23: What does a successful response look like?
9.7: Issues with Data and with the Classifications
public health initiatives
9.2: Chapter 10 in ICPH- Community and Public Health and Racial/Ethnic Populations
public policy
1.16: Summary
2.1: Learning Outcomes
2.13: Public Health Involves Making Public Policy for the Public Good
3.12: Making Changes to the Social Determinants Benefits Health
public_health
3: Social Determinants of Health
5: The Prevention and Control of Diseases
publichealth
1: Core Concepts and History of Public Health
1.13: World Health
1.15: Additional Resources
1.3: Focus on Prevention
1.8.1: The Social Ecological Model- Breast Cancer example
1.9: Public Health Early History
2: Organizations of Public Health
2.2: How Public Health Is Organized
2.5.1: Organization within a public health department
2.9: Challenges within the Public Health System
4.13: Secondary Data
4.2: Epidemiology and Public Health
4.6: Public Health Statistics
5.1: Learning Outcomes
5.2: The Public Health Approach
5.6: Types of Infectious Agents
6.6: More Examples of Organizing
6.7: Environmental Justice
6.9: Applying the Roles of the CHW to a Case Study
7.15: Preventing Climate Change and Adapting to Climate Change
7.3: What is environmental health
7.4: Environmental Health and the Emergence of the Modern Environmental Movement
8.9: What is good nutrition?
9.10: African Americans- Health overview and leading causes of death
9.15: Health Disparities in Specific Health Conditions
9.21: Culturally and Linguistically Appropriate Services (CLAS) Standards
9.9.2: Becoming American- episode of Unnatural Causes
publichealthresponse
2.9: Challenges within the Public Health System
publichealthstrategies
8.1: Learning Outcomes (goals for this module)
publicpolicy
10.11.1: Social Ecological Model to Reduce LBW and Preterm Birth

Q

qualitative
3.6: Social determinants have a major impact on health.
quality improvement
10.8.4: California- A Partial Success Story in Saving Mothers' Lives
quality of life
4.12: Reporting Births, Deaths, Diagnoses
quantitative
3.6: Social determinants have a major impact on health.

R

R0
4.11: Tracking the Spread of Covid-19

race
3.5: UNNATURAL CAUSES- In Sickness and In Wealth
9.16: Social Determinants of Health and Racial and Ethnic Disparities in Health
9.7: Issues with Data and with the Classifications
9.8: Snapshots of the Health of Racial and Ethnic Groups in the US
racial communities
9.23: What does a successful response look like?
racial disparities
10.8.4: California- A Partial Success Story in Saving Mothers' Lives
racial diversity
9.17: And now... cultural competence and cultural humility
racial equity
9.22: Health Inequities in the Pandemic
racial groups
9.2: Chapter 10 in ICPH- Community and Public Health and Racial/Ethnic Populations
racial minorities
9.14: Minority Health and Health Inequities (disparities)
9.6: Racial and Ethnic Classifications
racism
3.12: Making Changes to the Social Determinants Benefits Health
3.13: Change Can Happen
randomized control trials
4.16: Causation
rare diseases
5.4: Genetic Diseases
rates
4.9: Cases and Rates
refugee health
9.8: Snapshots of the Health of Racial and Ethnic Groups in the US
refugees
9.13: Immigrant and Refugee Health
regional variability
8.4: Americans have gained weight
reliability
4.19: Health Information
reproduction number
4.11: Tracking the Spread of Covid-19
reproductive health
6.12: How to create a health promotion program
research
3.8: Inequality Itself Correlates to Worse Health
3.9: Inequality in the United States
4.19: Health Information
4.22: The Value of Deeper Research
4.6: Public Health Statistics
research paper
2.1: Learning Outcomes
research studies
4.16: Causation
resilience
6.14: Lessons from Geese
resiliency factor
4.18: Risk Factors and Protective Factors
Richard Wilkinson
3.8: Inequality Itself Correlates to Worse Health
risk
7.5: Measuring Risk
risk assessment
7.5: Measuring Risk
Risk factor
4.18: Risk Factors and Protective Factors
risk factors
4.14: Epidemiological Studies
4.16: Causation
5.12: Noncommunicable Diseases
5.14: The Multi-Causation Model and the Ecological Model
riskfactors
1.8.1: The Social Ecological Model- Breast Cancer example
4.2: Epidemiology and Public Health
5.2: The Public Health Approach

S

Safe Drinking Water Act
7.6: Laws to Protect the Environment and Human Health
safety
7.5: Measuring Risk
safewater
1: Core Concepts and History of Public Health
sanitation
1.13: World Health
Santa Ana
6.5: Required Video Case Studies
SantaAna
6.9: Applying the Roles of the CHW to a Case Study
screening
5.16: Prevention, Intervention, Control, and Eradication of Diseases
5.17: Levels of Prevention
secondary prevention
5.17: Levels of Prevention
5.20: Examples of Prevention of Noncommunicable Diseases using the 3 levels of prevention
sedentary
8.10: Physical Activity
sedentary lifestyle
8.3: Regarding obesity, we have at least two controversies
sewage
7.4: Environmental Health and the Emergence of the Modern Environmental Movement
sexism
3.12: Making Changes to the Social Determinants Benefits Health
sexual health
6.12: How to create a health promotion program
sleep_debt
8.8: What causes obesity? What causes the diseases associated with obesity?
smoking
4.18: Risk Factors and Protective Factors
social advocacy
6.1: Learning Outcomes
social capital
9.16: Social Determinants of Health and Racial and Ethnic Disparities in Health
social category
9.7: Issues with Data and with the Classifications
social conditions
1.6: Factors that Contribute to Health
social construct
9.6: Racial and Ethnic Classifications
social determinants
3.11: Actions that work toward equality and health
3.2: What are "social determinants of health?"
3.5: UNNATURAL CAUSES- In Sickness and In Wealth
3.9: Inequality in the United States
4.19: Health Information
5.13: Multi-Causation Models of Disease
social determinants of health
1.12: Twenty-First Century Public Health
10.8.3: Life Course Perspective
2.1: Learning Outcomes
3.10: Making Change
3.12: Making Changes to the Social Determinants Benefits Health
3.13: Change Can Happen
3.3: Healthy People 2030 and the Social Determinants of Health
3.4: Ecological Model and the Social Determinants
6: Community Organizing, Community Building, and Health Promotion
6.8: Why community organizing for public health?
9: Community Health in Diverse Racial and Ethnic Populations Communities in the US
9.16: Social Determinants of Health and Racial and Ethnic Disparities in Health
9.2: Chapter 10 in ICPH- Community and Public Health and Racial/Ethnic Populations
social isolation
9.22: Health Inequities in the Pandemic
social justice
2.12: Core functions of state and local public health agencies and the 10 essential services
6.3: What Is Community Organizing?
social norms
2.10: Example of Public Health Organizations Working Together
social status
3.8: Inequality Itself Correlates to Worse Health
social_determinants
3: Social Determinants of Health
social_support
9.9: Americans of Hispanic Origin- Health overview and leading causes of death
socialdeterminants
2: Organizations of Public Health
3.1: Learning Outcomes
socialdeterminantsofhealth
3.7: Embodiment
6.6: More Examples of Organizing
socialecologicalmodel
1.8.1: The Social Ecological Model- Breast Cancer example
socialjustice
1.9: Public Health Early History
5.2: The Public Health Approach
socialnetworks
9.9.2: Becoming American- episode of Unnatural Causes
socialnorms
1.8.1: The Social Ecological Model- Breast Cancer example
socialpsychology
4.2: Epidemiology and Public Health
society
3.4: Ecological Model and the Social Determinants

socioeconomic differences
9.11: Asian Americans and Pacific Islanders- Health overview and leading causes of death

socioeconomic factors
3.2: What are "social determinants of health?"

socioeconomic status
3.5: UNNATURAL CAUSES- In Sickness and In Wealth
9.1: Goals for this Module (also known as learning outcomes)
9.2: Chapter 10 in ICPH- Community and Public Health and Racial/Ethnic Populations

socioeconomic_status
9.9: Americans of Hispanic Origin- Health overview and leading causes of death

socioeconomicstatus
3.6: Social determinants have a major impact on health.
3.7: Embodiment

sodatax
6.6: More Examples of Organizing

solutions strategies
6.4: Organizing steps in a campaign for change

statistics
4: Epidemiology- The Study of Disease, Injury and Death in the Community
4.12: Reporting Births, Deaths, Diagnoses
4.13: Secondary Data
4.6: Public Health Statistics
4.9: Cases and Rates

stress
3.8: Inequality Itself Correlates to Worse Health

stroke
5.12: Noncommunicable Diseases
8.5: ONE VIEW- Obesity - the most serious health problem of our day!

structural changes
6.11: Health Promotion Programs

studentengagement
1.15: Additional Resources

support
6.14: Lessons from Geese

supportsystems
10.11.1: Social Ecological Model to Reduce LBW and Preterm Birth

surveillance
5.2: The Public Health Approach

sustainability
6.9: Applying the Roles of the CHW to a Case Study
7.15: Preventing Climate Change and Adapting to Climate Change

symptoms
5.3: Classification of Diseases

T

teamwork
6.14: Lessons from Geese

tertiary prevention
5.17: Levels of Prevention
5.20: Examples of Prevention of Noncommunicable Diseases using the 3 levels of prevention

tobacco smoking
4.16: Causation

tobacco use
2.13: Public Health Involves Making Public Policy for the Public Good

TobaccoControl
2.5.1: Organization within a public health department

tools
9.17: And now... cultural competence and cultural humility

toxicology
7.5: Measuring Risk

Toxins
6.7: Environmental Justice

training
3.11: Actions that work toward equality and health

transmission
5.6: Types of Infectious Agents
5.8: Modes of Transmission

transphobia
3.12: Making Changes to the Social Determinants Benefits Health

trauma
9.13: Immigrant and Refugee Health

tribes
9.12: American Indians and Alaska Natives- Health overview and leading causes of death

tuberculosis
5.8: Modes of Transmission

TuskegeeExperiment
9.10: African Americans- Health overview and leading causes of death

Type 2 diabetes
8.5: ONE VIEW- Obesity - the most serious health problem of our day!

U

UNFPA
2.2: How Public Health Is Organized

UNICEF
2.2: How Public Health Is Organized

United States
9.14: Minority Health and Health Inequities (disparities)

UnitedStates
2.2: How Public Health Is Organized

Unnatural Causes
3.5: UNNATURAL CAUSES- In Sickness and In Wealth

upstream
1.3: Focus on Prevention

us
9.17: And now... cultural competence and cultural humility

US census
9.8: Snapshots of the Health of Racial and Ethnic Groups in the US

V

vaccination
1.10: Twentieth Century Public Health
1.4: Public Health and Medicine
1.9: Public Health Early History
2.9: Challenges within the Public Health System
3.10: Making Change
4.11: Tracking the Spread of Covid-19
5: The Prevention and Control of Diseases
5.19: Vaccination and how rates are changing in California
5.5: Communicable Diseases
9.23: What does a successful response look like?

vaccine hesitancy
5.19: Vaccination and how rates are changing in California

vaccines
1: Core Concepts and History of Public Health
1.9: Public Health Early History
4.14: Epidemiological Studies
5.19: Vaccination and how rates are changing in California

variolation
1.9: Public Health Early History

vegetables
8.9: What is good nutrition?

Videos
1.15: Additional Resources

virulence
5.5: Communicable Diseases

viruses
5.6: Types of Infectious Agents

vitalstatistics
4.13: Secondary Data

W

waste management
7: Environmental Health
7.18: Additional Resources
7.2: Learning Outcomes

water quality
7: Environmental Health
7.2: Learning Outcomes
7.6: Laws to Protect the Environment and Human Health

waterequality
7.3: What is environmental health

wealth
3.5: UNNATURAL CAUSES- In Sickness and In Wealth
3.8: Inequality Itself Correlates to Worse Health

weight
8.7: A DIFFERENT VIEW- Obesity - a manifestation of fat-phobia and a distraction from the real issues!

weight bias
8: Weight, weight bias, nutrition and physical activity

weight loss
8.3: Regarding obesity, we have at least two controversies
8.7: A DIFFERENT VIEW- Obesity - a manifestation of fat-phobia and a distraction from the real issues!

wellbeing
3.8: Inequality Itself Correlates to Worse Health
8.10: Physical Activity

Wellness
1.3: Focus on Prevention
1.5: Public Health and Personal Health
1.6: Factors that Contribute to Health
10.11.1: Social Ecological Model to Reduce LBW and Preterm Birth
8.9: What is good nutrition?
WHO
1.10: Twentieth Century Public Health
2.2: How Public Health Is Organized
womenshealth
1.8.1: The Social Ecological Model- Breast Cancer example
workforce
9.21: Culturally and Linguistically Appropriate Services (CLAS) Standards
workplace safety
5.18: Prevention of Communicable Diseases
WSCC Model
2.10: Example of Public Health Organizations Working Together

X

xenophobia
3.12: Making Changes to the Social Determinants Benefits Health

Y

youth health
6.12: How to create a health promotion program

Z

zoonosis
5.6: Types of Infectious Agents

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GLOSSARY

B

biomedical model | addresses health issues as a function of risk factors, symptoms, diagnoses, and treatments; rooted in clinical medicine

C

community organizing | Community organization is defined as the process by which community groups are helped to identify common problems or goals, mobilize resources, and develop and implement strategies for reaching the goals they collectively have set.

D

downstream | closer to the impacts or effects of a health problem (contrasted with upstream); akin to tertiary prevention

G

germ theory | the currently accepted scientific theory for many diseases, stating that microorganisms known as pathogens or "germs" can cause infectious disease. [https://en.Wikipedia.org/wiki/Germ_theory_of_disease]

H

health education | any combination of planned learning experiences using evidence-based practices and/or sound theories that provide the opportunity to acquire knowledge, attitudes, and skills needed to adopt and maintain health behaviors. [Coalition of National Health Education Organizations. (2020). Joint Committee on Health Education and Promotion Terminology Report. https://www.cnheo.org/2020-joint-com...rminology.html]

health promotion | any planned combination of educational, political, environmental, regulatory, or organizational mechanisms that support actions and conditions of living conducive to the health of individuals, groups, and communities. [Coalition of National Health Education Organizations. (2020). Joint Committee on Health Education and Promotion Terminology Report. https://www.cnheo.org/2020-joint-com...rminology.html]

Healthy People 2030 | Healthy People 2030 is the nation's 10-year plan for addressing critical public health priorities and challenges, with measurable objectives and resources for action. [https://odphp.health.gov/our-work/na...ons-answers#q1]

I

isolation | separating a person with an active infection from others to prevent spread

L

life expectancy | the average number of years of life remaining to a person at a particular age (e.g., life expectancy at birth, life expectancy at age 60) [https://www.cdc.gov/nchs/hus/sources...expectancy.htm]

M

miasma theory | an abandoned medical theory that held that diseases were caused by a *miasma*, a noxious form of "bad air". [https://en.Wikipedia.org/wiki/Miasma_theory]

P

protective factor | traits, behaviors or conditions that decrease the probability of disease, injury, or death

Q

quarantine | separating a person with a suspected exposure or infection from others to prevent spread

R

risk factor | traits, behaviors or conditions that increase the probability of disease, injury, or death

S

social determinants of health | the conditions in which people are born, grow, live, work and age, and people's access to power, money and

resources [https://www.who.int/health-topics/so...alth#tab=tab_1]

social ecological model | identifies health outcomes as influenced by the interaction among the individual, the group/community, and the physical, social, and political environments

U

upstream | closer to the cause of a health problem (contrasted with downstream); akin to primary prevention

V

vaccination | The process of using a vaccine to stimulate the immune system to provide protection against a disease. [https://www.cdc.gov/nchs/hus/sources...accination.htm]

vaccine | a preparation that is administered (as by injection) to stimulate the body's immune response against a specific infectious agent or disease; it may include an attenuated (weakened or inactive) version of the infectious agent, or a genetic fragment of the infectious agent, or an unrelated compound that creates immune response to a biological or nonbiological agent (including poisons) [https://www.merriam-webster.com/dictionary/vaccine]

variolation | historical method of immunizing healthy individuals against smallpox by infecting them with substance from the sores of patients with a mild form of the disease [https://www.britannica.com/science/variolation]

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