INTRODUCTION TO PUBLIC HEALTH



Fabiane Morales
Coastline College

LibreTexts™

Introduction to Public Health

This text is disseminated via the Open Education Resource (OER) LibreTexts Project (https://LibreTexts.org) and like the thousands of other texts available within this powerful platform, it is freely available for reading, printing, and "consuming."

The LibreTexts mission is to bring together students, faculty, and scholars in a collaborative effort to provide an accessible, and comprehensive platform that empowers our community to develop, curate, adapt, and adopt openly licensed resources and technologies; through these efforts we can reduce the financial burden borne from traditional educational resource costs, ensuring education is more accessible for students and communities worldwide.

Most, but not all, pages in the library have licenses that may allow individuals to make changes, save, and print this book. Carefully consult the applicable license(s) before pursuing such effects. Instructors can adopt existing LibreTexts texts or Remix them to quickly build course-specific resources to meet the needs of their students. Unlike traditional textbooks, LibreTexts' web based origins allow powerful integration of advanced features and new technologies to support learning.



LibreTexts is the adaptable, user-friendly non-profit open education resource platform that educators trust for creating, customizing, and sharing accessible, interactive textbooks, adaptive homework, and ancillary materials. We collaborate with individuals and organizations to champion open education initiatives, support institutional publishing programs, drive curriculum development projects, and more.

The LibreTexts libraries are Powered by NICE CXone Expert and were supported by the Department of Education Open Textbook Pilot Project, the California Education Learning Lab, the UC Davis Office of the Provost, the UC Davis Library, the California State University Affordable Learning Solutions Program, and Merlot. This material is based upon work supported by the National Science Foundation under Grant No. 1246120, 1525057, and 1413739.

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation nor the US Department of Education.

Have questions or comments? For information about adoptions or adaptions contact info@LibreTexts.org or visit our main website at https://LibreTexts.org.

The LibreTexts name, logo, and book covers are trademarked by LibreTexts, Inc. (a 501(c)(3) not-for-profit organization) and protected against unauthorized use.

This text was compiled on 09/18/2026

Preface and Acknowledgments

Preface and Acknowledgments

The public health landscape is constantly shifting, shaped by emerging data and the evolving needs of our communities. Because public health is tightly woven into policy, the political environment plays a pivotal role in its direction. This textbook is intended to give students entering the field, or those with a budding interest in the discipline, a foundational understanding of public health principles applicable to the policies and challenges of 2026.

I encourage all who use this resource to view it as a "living document." It is designed to be accessible to all, yet it will require ongoing revision as community needs evolve. To that end, I invite fellow professors and practitioners to provide their insights for future editions. If you have feedback or suggestions for revision, please contact me via the LibreTexts platform https://connections.libretexts.org/d...abiane-morales; I am happy to consider your expertise to ensure this resource remains current and impactful.

I began writing this Open Educational Resource (OER) with the intent of making contemporary public health information both succinct and applicable. To this end, you will find these pages to be concise and consistently focused on a public health perspective, with references readily available at the end of each section. My goal was to create a guide useful to everyone, from dedicated students to engaged community members. To ensure equitable access, I have diligently worked to meet the most recent **Web Content Accessibility Guidelines (WCAG) 2.1 Level AA standards**, ensuring that neither financial nor physical barriers stand in the way of knowledge.

Acknowledgments

This project reached completion through the collective insight and support of many dedicated colleagues. I am grateful to Coastline Community College and my Department Chair, Laurie Runk, for providing the space and support for my creativity to flow within these pages.

I would also like to thank my fellow educators, Janey Skinner and Erin Calderone, for their input, and the entire LibreTexts team, especially Justin Shorb, for their support in navigating the technical challenges that arose. Finally, I am grateful to my family and close friends for supporting this endeavor and giving me the time and space to brainstorm and gather the research needed to bring this vision to life.



Fabiane Morales, MPH

This page titled Preface and Acknowledgments is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

TABLE OF CONTENTS

Preface and Acknowledgments

Licensing

1: What is Public Health?

1.1: What Exactly is Public Health?

1.2: History of Public Health

1.3: Public Health vs Personal Health

1.4: Approaches to Protect and Promote Health

1.5: Risk Factors and Protective Factors

1.6: The Healthy People Initiative 1990-2030

1.7: Social Determinants of Health

2: Evidence-Based Public Health

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

2.2: Burden of Disease and Epidemiology

2.3: Vital Statistics

2.4: Health Disparities and Inequalities

2.5: Types of Population Studies

2.6: Observational Studies

2.7: Experimental Studies

2.8: Etiology and Contributory Cause

2.9: Program Planning

2.9.1: Program Planning - Needs Assessment

2.9.2: Program Planning - Goals and Objectives

2.9.3: Program Planning - Implementing an Intervention

2.9.3.1: Recommendations

2.9.3.2: Primary, Secondary and Tertiary Intervention

2.9.4: Program Planning - Evaluation

2.9.5: P.E.R.I.E. Process

3: Data and Communication

3.1: Where do Public Health Data Come From?

3.2: Public Health Surveillance

3.3: Notifiable Diseases

3.4: Quality of Health Information

3.4.1: Internet, Social Media, and the Age of Algorithm

3.4.2: Credible Sources

3.5: Measuring the Health of a Population

4: Public Health and Behavioral Science

4.1: The Relation between Public Health and Social and Behavioral Sciences

4.2: The Relation between Social Systems and Health

4.3: Behavioral Change Models and Theories

4.3.1: Theory of Planned Behavior

4.3.2: Health Belief Model

4.3.3: Social Cognitive Theory

4.3.4: Self-Determination Theory

4.3.5: Transtheoretical Model AKA-Stages of Change

4.3.6: The Social-Ecological Model

4.3.7: Community Intervention Models

4.3.8: Mobilizing Action through Planning and Partnerships (MAPP)

4.3.9: PRECEDE-PROCEED Model

4.3.10: Diffusion of Innovation

4.4: Influence of Change Health Behavior

4.5: Prevalent Health Concerns through the Life Phases

4.5.1: Maternal, Infant and Child

4.5.2: Adolescent and Adulthood

4.5.2.1: Unintentional Injuries

4.5.2.2: Violence

4.5.2.3: Drug Abuse and Addiction

4.5.2.4: Tobacco Use

4.5.2.5: Nutrition

4.5.2.6: Physical Activity and Fitness

4.5.2.7: Obesity

4.5.2.8: Mental Health

5: Health Law Policy and Ethics

5.1: Bioethics

5.2: Police Power

5.3: Health Policy

5.4: Types of Law

5.5: Pandemic Response

6: Non-Communicable Diseases

6.1: Non-Communicable Diseases and Public Health

6.2: Screening

6.3: Interventions

6.4: Genetic Testing

6.5: Research

7: Communicable Diseases

7.1: Communicable Diseases and Public Health

7.2: Endemic, Epidemic, and Pandemic

7.3: Tools of Public Health- Barrier

7.4: Tools of Public Health- Screening

7.5: Tools of Public Health- Immunization

7.6: Tools of Public Health- Treatment

7.7: How can elimination or eradication be attained?

7.8: Pandemic Prevention

8: Environmental Health and Safety

8.1: Issues in Environmental Health

8.2: Unaltered, Altered, and Built Environments

8.3: Risk Assessments

8.4: Multiplicative Interaction

8.5: Safety

9: Health Professionals and Healthcare Systems

9.1: Health Professionals

9.2: Healthcare Institutions

9.3: Healthcare Systems

9.3.1: Health Insurance Terms

9.3.2: Governmental System

9.3.3: Employer-based Systems

9.3.4: Uninsured and Underinsured

10: Public Health Institutions and Systems

10.1: Essential Public Health Services

10.2: U.S. Public Health Agencies

10.2.1: Federal Agencies

10.2.2: State and County Health Agencies

10.2.3: Quasi-Governmental Organizations

10.3: The World Health Organization

Index

Glossary

Detailed Licensing

This page titled Introduction to Public Health (Morales) is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

Licensing

A detailed breakdown of this resource's licensing can be found in ***Back Matter/Detailed Licensing***.

This page titled Licensing is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

1: WHAT IS PUBLIC HEALTH?

Public health aims to promote positive health outcomes for everyone. 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!

As a field, public health encompasses a range of scientific disciplines, jobs, and practices, all united by a commitment to improving public health. 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 work to prevent them on a large scale. In fact, **prevention** is probably the most important word in the public health lexicon.

This chapter introduces core concepts and tools in public health. The discussion will include a more detailed explanation of public health, its history, its relationship to personal health, and the approaches used to study it.

1.1: What Exactly is Public Health?

1.2: History of Public Health

1.3: Public Health vs Personal Health

1.4: Approaches to Protect and Promote Health

1.5: Risk Factors and Protective Factors

1.6: The Healthy People Initiative 1990-2030

1.7: Social Determinants of Health

This page titled 1: What is Public Health? is shared under a Public Domain license and was authored, remixed, and/or curated by Fabiane Morales.

- 1.2: What Is Public Health? by Janey Skinner is licensed CC BY-NC-SA 4.0.

1.1: What Exactly is Public Health?

A frequently-cited definition of public health, written in 1920 by public health pioneer, founder of modern public health in the United States, and the person who established the Yale School of Public Health in 1915, 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." (Wikipedia, 2025). A photograph of Charles-Edward Amory Winslow is provided in Figure 1, below.

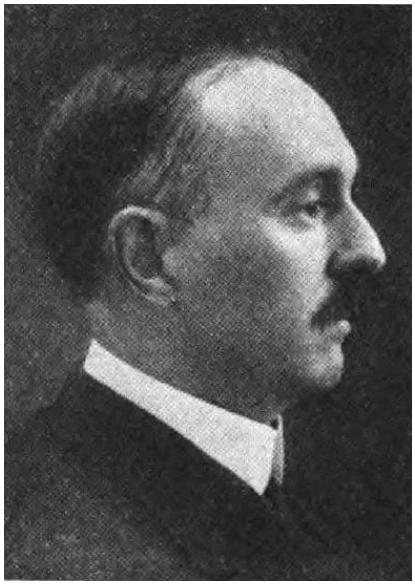


Figure 1.1.1: A photograph of Charles-Edward Amory Winslow, which depicts him in a side view. (Public Domain; Wikipedia)

You may not realize it, but public health is involved in almost every minute of your day. The following are some examples of how our lives are intrinsically connected with public health:

- If you have access to electricity, clean water, and a functioning toilet, you can avoid exposure to infectious diseases and environmental toxins. These are foundational to public health and include the critical components that underpinned its origins (as covered in the history of public health on the next page): water, sanitation, and hygiene.
- If a classmate or coworker is ill, you may contract their illness and pass it on to your family members or friends. This illustrates how infectious diseases spread through a population; another example of large-scale communicable disease transmission was the COVID-19 pandemic we all endured.
- Perhaps you'd like to eat something other than what's available in the vending machine, since you know how important nutrition is for your health, but you are limited by the options in front of you. If the only food available during a 10-minute break is a vending machine stocked with high-sodium, high-sugar snacks, the "healthy choice" becomes the difficult one. Public health is involved in policymaking to ensure that healthier choices are available.
- When you go to work, both you and your employer have to follow specific safety rules - especially if you handle food being served to the public or work with dangerous machinery. Occupational health (a subdivision of public health) regulatory compliance helps ensure that workers do not sacrifice their physical or mental health in the workplace.
- Your mental health may be affected if you feel too stressed to exercise and then "doomscroll" on your phone. Public health looks beyond your "willpower" to ask "why" you are this stressed. This connects to the **Social Determinants of Health** (covered in the next chapter); public health seeks to address the issue at its root through policy changes (such as "Right to Disconnect" laws) (Atlas, 2026).
- Today, the health information you encounter on social media is a blend of current science, misinformation, and disinformation (aka **infodemic**). When we are overwhelmed by conflicting information, we stop making healthy choices altogether (behavior paralysis). Public health is about cleaning up the "information environment," ensuring that the healthy choice remains easy and obvious (Association of Schools & Programs of Public Health, 2026).

Through the examples above, you can understand how public health influences our lives even when we are not aware. There is an interconnection between individual health and public health; however, there are also distinct approaches to health (this will be

discussed further on the next page: Personal Health vs. Public Health). For now, know that individual health is interdependent: actions taken at the community level directly influence individual well-being, and vice versa (Arah, 2008), and that public health focuses on population health (not the individual).

Public health focuses on the well-being of entire **populations**, from small neighborhoods to global populations. It's about proactively improving health through prevention, education, and policy, rather than just treating individuals. This includes promoting healthy habits, preventing diseases and injuries, controlling outbreaks, and ensuring everyone has equal access to quality healthcare. As we look into the health of the population, public health professionals may use a healthcare delivery system that is focused on individuals to help deliver the public health message (here you are seeing the inter-connectiveness), it also used traditional public health institutions that are specifically focused on populations, such as governmental health agencies, and one can also use social policy interventions by working with lawmakers to implement new law to promote a healthier population.

Public health's primary goals and commitments reflect its core values, which are rooted in health, science, and the community (Public Health Leadership Society, 2002). Everyone recognizes the value of health, but public health approaches it through science and community to prevent disease and injury, protect the public from harm, and promote health and well-being. Public health values science by endeavoring to base interventions and policies on the best available data and evidence-based practices. That endeavor entails a commitment to conduct surveillance and research, because only by understanding the social burden of disease and its underlying or structural causes can public health impact the health of the entire population. Public health values community, defined as a network of relationships and emotional bonds among people who share a life in common, organized through a political and moral order (Jennings, 2007). The value that best reflects this fundamental, relational character of social life is **solidarity**. Solidarity can remain unspoken yet operative because it forms the basis of social life and collective action. Personal interests, to be sure, can motivate individuals, but the felt recognition of a common plight, that we are all in it together, underlies the collective decisions society and public health must make to solve collective problems (Dawson and Jennings, 2012).

Below is a video that explains the connections between personal health and public health.

What is Public Health?

This video from Crash Course, an educational publisher based in the United Kingdom, offers an excellent overview of public health and connects our individual health to the community's health.

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

CrashCourse video via YouTube. Caption available.

Reference

Atlas. (2026). Exploring the global 'Right to Disconnect': How different countries are shaping work-ife balance. Atlas www.atlashxm.com/resources/

Arah, O. A. (2008). On the relationship between individual and population health. Medicine Healthcare and Philosophy. 2009 Aug;12(3):235-44. doi: 10.1007/s11019-008-9173-8

Association of Schools & Programs of Public Health. (2026). Confronting Mis and Disinformation in public health. ASPPH aspph.org

Dawson, A., and B. Jennings. 2012. The place of solidarity in public health ethics. Public Health Reviews 34: 65–79. doi.org/10.1007/BF03391656

Jennings, B. 2007. Public health and civic republicanism. In Ethics, prevention, and public health, ed. A. Dawson and M. Verweij,

30–58. Oxford: Oxford University Press.

Public Health Leadership Society. 2002. Principles of the ethical practice of public health. APHA www.apha.org

Wikipedia. (2025). Charles-Edward Amory Winslow. Wikipedia en.wikipedia.org

This page titled 1.1: What Exactly is Public Health? is shared under a Public Domain license and was authored, remixed, and/or curated by Fabiane Morales.

1.2: History of Public Health

Infectious diseases were the primary focus of most public health efforts in the early 1900s. By the 2000s, it had evolved to address chronic health conditions, behavioral health, environmental health, and the social determinants of health. Although global public health efforts were equally complex and important, this section will illustrate some of the history that brought us to the public health of today in the United States; however, the history will be viewed globally because that is how our history began.

Ancient times

As early human societies transitioned from hunter-gatherers to agricultural communities, they began developing structured methods to combat and treat illness. Ancient civilizations in China, India, and Egypt laid the groundwork through medical documentation and agricultural laws designed to limit the spread of disease. These efforts were often intertwined with religion, such as the Hebrew Mosaic Law (also known as Law of Moses/Torah is a set of 613 divine commandments, including the Ten Commandments, revealed to Moses by God for the nation of Israel, documented in the first five books of the Bible [Bible.org, 2026]), this law codified public health through strict rules on hygiene, food safety, and the isolation of the sick (Tulchinsky & Varavikova, 2014, pp. 1–4).

The Greeks furthered this progress by shifting toward a medical philosophy that considered environmental causes for disease, while the Romans applied these concepts to large-scale infrastructure, building aqueducts and sewage systems that defined early urban planning. However, these advancements were not universal; throughout ancient history, a person's quality of life and longevity were heavily dictated by socioeconomic status, gender, ethnicity, and class (Tulchinsky & Varavikova, 2014, pp. 1–4).

In summary, in ancient times, health promotion and disease prevention were deeply ingrained in community life. Early civilizations integrated preventive measures into their way of life, from religious practices to legal codes, as evidenced by dietary prohibitions and formalized food-preparation techniques. Such measures included: prohibitions of certain foods like pork, beef, and seafood, specific ways of killing animals and cooking food, prohibition or limitation of alcohol, and prohibition of cannibalism.

Medieval Times

In the late medieval period (up to the 15th century), people moved from rural areas to towns and cities, creating new challenges for sanitation and overcrowding. Even as progress was made in medical education (universities were established across Europe and the printing press increased educational opportunities), these towns and cities were overwhelmed by plagues of communicable diseases. Cholera, measles, and smallpox epidemics were exacerbated by poverty and unsanitary living conditions. Plagues, wars, and famines decimated the populations of the European and Asian continents. The causes of these plagues were largely unknown, and the “miasma theory” (handed down from ancient Greek doctors, who thought diseases were caused by "bad air," in other words, foul odors) was, at the time, still the most accepted explanation. (Wikipedia, 2025). Although the discovery of pathogens and the wide acceptance of germ theory did not occur until the mid-19th century, some public health measures suggested by miasma theory remained effective. This is a great example of how societies can still take actions to prevent disease even if the disease is novel or little is known about it. Let’s take a closer look at one of the most famous plagues and the evolution of public health responses to it.

The Plague

The Plague was the cause of the infamous pandemics known as the bubonic and pneumonic plagues throughout Europe, Asia, Russia, India, and the Middle East from the 14th to the 20th centuries. Both types of plague were due to a bacteria (Yersinia pestis). The bubonic plague was first transmitted by fleas that infested rats. Victims developed “buboes,” or lymph node swelling, as the bacteria proliferated there. It then, caused gangrene (death of the tissue due to lack of blood flow) of the extremities. The pneumonic form infected the respiratory tract and was transmitted between humans via inhalation, coughing, or sneezing. All cases of this disease began with fever and flu-like symptoms, then progressed rapidly over a few to several days. Before antibiotics were made available in the early 20th century, this disease was quite deadly - killing an estimated 25-50 million people in Europe and half of the population of China between the 12th and 15th centuries (Tulchinsky & Varavikova, 2014, Glatter & Finkelman, 2021).

Responses to the plague were characterized by fear and superstition. Cats were suspected of carrying the disease, which led

to their extermination. Oddly enough, the cat population could have helped cull the rats that actually carried the infected fleas (Tulchinsky & Varavikova, 2014). Currently, we know that cats are also susceptible to the plague, either by eating infected rats or by being bitten by fleas (CDC, 2022). Another, potentially more effective strategy involved quarantining ships for 30-40 days in port before allowing any goods or people to disembark. (The word "quarantine" actually derives from this practice - in Italian, quarantina = 40 days.) Additionally, some governments implemented social distancing measures, such as bans on religious functions or funerals, but these measures were often strongly resisted by the public (Tulchinsky & Varavikova, 2014).

Jewish communities seemed to have lower rates of infection from the plague, the recognition of which stoked anti-semitism among the Christian Europeans. Jews were blamed for spreading the plague, persecuted, and massacred throughout Europe as a result of this superstition. Although Hebraic hygiene practices could have played a role in reducing the spread of plague in these communities, it was later discovered that a genetic mutation caused by a rare disease (familial Mediterranean fever), provides immunity to the plague bacteria. This genetic mutation is found most often in people of Israeli, Armenian, Arab, and Turkish descent (Glatter & Finkelman, 2021).

Although we may think of the plague as a long-past disease, it remains endemic (recurring seasonally) in several regions worldwide. It can be treated if caught early with antibiotics, and those exposed can also use antibiotics as a prophylactic (preventative) measure. However, there is still some concern about the pneumonic plague being used for bioterrorism, as it causes such swift illness and death, and can be transmitted easily between humans (Ansari et al., 2020).

The Role of Isolation and Quarantine

One of the health measures that we have implemented for millennia is **isolation**. Societies have implemented isolation and quarantine to control the spread of disease. This early understanding of isolation's protective role marked the beginning of organized disease prevention. However, these practices were often based on observation rather than scientific understanding.

Difference between isolation and quarantine (U.S. Department of Health and Human Services, 2022):

- **Isolation** separates sick people with a contagious disease from people who are not sick.
- **Quarantine** separates and restricts the movement of people who have been exposed to a contagious disease to determine whether they become ill. These individuals may have been exposed to a disease and be unaware of it, or they may have the disease but not exhibit symptoms.

Smallpox

The first disease to be eradicated this far, with no new cases since 1977, smallpox and its history are fascinating. Smallpox was a severe, highly contagious, and often fatal disease caused by the variola virus. A person with smallpox experiences sudden high fever, headache, body aches, and fatigue, followed by a distinctive rash that starts in the mouth and spreads to the face, arms, and legs, developing into pus-filled blisters that crust and fall off, leaving pitted scars, with transmission occurring through face-to-face contact until scabs fall off (Centers for Disease Control and Prevention, 2024). Following is an 8-minute audio story about the last case of smallpox.

The Last Smallpox Case

This 8-minute audio provides a story of Rahima Banu, the last smallpox case.

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

Public Domain NPR Transcript available within the linked source.

Records show smallpox dates back to at least 1350 BCE, claimed hundreds of millions of lives, and killed roughly one in three infected individuals before becoming the only human disease ever eradicated. For centuries, diverse cultures employed **variolation**—the practice of exposing healthy people to smallpox material to induce a milder infection—using methods such as nasal insufflation in China and skin inoculation in India, Africa, and the Ottoman Empire. This ancient wisdom eventually reached the West through figures such as Lady Mary Wortley Montagu (the wife of an ambassador to Turkey) and, in the United States Colonies 1716, enslaved West Africans instilled the practice to a man named Cotton Mather.

The turning point occurred in 1796 when **Dr. Edward Jenner** developed the world's first vaccine by using the less dangerous cowpox virus to confer immunity, a breakthrough that laid the foundation for modern immunology. This scientific advancement, combined with 20th-century global health strategies such as mass immunization and targeted surveillance and containment, ultimately led to the most significant milestone in public health history: the total worldwide eradication of the virus (World Health Organization, 2026).

It is interesting to know that Mozart, as well as Abraham Lincoln, was infected with smallpox, and cases were found in Egyptian mummies (World Health Organization, 2026)!

Historical Importance and the Roots of Social Determinants of Health

The 19th century (the 1800's) brought massive population movements -- and again, not always voluntary. In England, the "commons," where farmers grazed their livestock, were fenced off and privatized, which forced many people into cities and 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 United States (US. Department of Health and Human Services Office of Minority Health, 2025). 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-1800s were a period of great ferment in public health and social movements, and the social justice roots of public health work took hold, laying the groundwork for what we now call the Social Determinants of Health (which will be covered under the Health Disparities and Inequalities section).

In England, as more of the population moved to cities, disease outbreaks occurred. One historical event happened in 1854, where a severe outbreak of cholera (now we know Cholera is due to a water-borne bacterium called *Vibrio Cholerae*) killed more than 500 people in two weeks! Noticing this, physician John Snow (figure 1, below) mapped the cases and identified the source of the outbreak. In London at that time, drinking water was supplied from the Thames River via water pumps located on street corners. By mapping cholera cases, John Snow identified the Broad Street Pump as the source of contamination and had the handle removed. Not only did he identify the pump, but he also identified the source as a sewage-contaminated waterborne organism from the Thames River, which was the root cause of the problem (Wikipedia, 2025). For his contribution, John Snow is considered the father of modern Epidemiology (Tulchinsky, 2018).

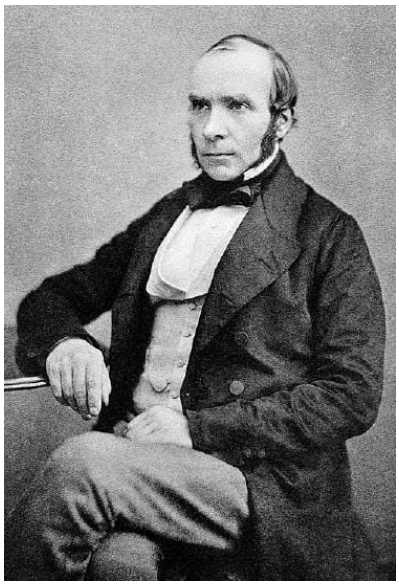


Figure 1.2.1: John Snow depicted sitting, looking away from the picture taker. Public Domain. Wikipedia

Many in the medical establishment, at the time, did not accept John Snow's theory that the cholera outbreak was due to fecal contamination from the Thames River into the drinking water via the water pump. The catalyst for a sanitation installation in the United Kingdom was twofold: one was "The Great Stink" in 1858, when the smell of raw sewage in the Thames became unbearable. Two other cholera outbreaks in other parts of the United Kingdom between 1848 and 1849 killed 53,000 people. These factors led to the enactment of the Public Health Act 1848 to manage sanitation in overcrowded towns (UK Parliament, 2026). Eventually, John Snow's theory was validated, and he was recognized as the founder of modern public health, the father of epidemiology, and the acceptance of germ theory (Science Museum, 2019).

> Miasma Theory: where air, "bad air", emanating from rotting corpses, is the cause of disease.
>
> Germ Theory: where organisms (most commonly bacteria, viruses, fungi, and protozoa) are the cause of disease.

The following are a few notable categories on how public health has evolved, its accomplishments, and its ongoing challenges (Centers for Disease Control and Prevention, n.d.):

Sanitation and Environmental Health:

500 BCE: The Greeks and Romans practiced community sanitation measures.

1840s: The Public Health Act of 1848 was established in the United Kingdom.

1970: The Environmental Protection Agency was founded.

Pandemics:

1918 Influenza: 500 million infected worldwide.

1955 Polio: The Polio Vaccine was introduced in 1955; the eradication initiative launched in 1988.

1980s HIV: 34 million living with HIV worldwide; 20% decline in new infections since 2001.

2019 Covid-19: As of the writing of this literature, the reported deaths from Covid-19 have been 7.1 million worldwide (World Health Organization, 2024).

Prevention Through Policy:

1961 Tobacco Hazard: Evidence of the health hazards of smoking was established (American Lung Association, 2025)

1968 Seat Belt Mandatory: Seat belts became nationally mandated (AAA, n.d.)

1973 Obesity Prevention: First regulations of food nutritional labels (Food Dive, 2025).

2006 HPV vaccine was introduced (St Jude Children's Research Hospital, n.d.).

Reference

AAA. (n.d.) A seat belt history timeline. AAA www.magazine.northeast.aaa.com

American Lung Association. (2025). Tobacco Control Milestones. American Lung Association www.lung.org

Ansari, I., Grier, G., & Byers, M. (2020). Deliberate release: Plague - A review. Journal of Biosafety and Biosecurity, 2(1), 10–22. doi.org/10.1016/j.jobb.2020.02.001

Bible.org. 2026. The Mosaic Law: Its function and purpose in the New Testament. Bible.org bible.org/article/mosaic-law

Centers for Disease Control and Prevention (n.d.). Public Health 101 Series. Centers for Surveillance, Epidemiology, and Prevention. www.cdc.gov

Centers for Disease Control and Prevention. (2022). Plague for veterinarians. CDC www.cdc.gov/plague

Centers for Disease Control and Prevention. (2024). About Smallpox. CDC www.cdc.gov/smallpox/about

Food Dive. (2025). The origins and evolution of Nutrition Facts labeling. Food Dive www.fooddive.com/news

Glatter, K. A., & Finkelman, P. (2021). History of the Plague: An Ancient Pandemic for the Age of COVID-19. The American Journal of Medicine, 134(2), 176–181. doi.org/10.1016/j.amjmed.2020.08.019

Science Museum. (2019). Cholera in Victorian London. Science Museum www.sciencemuseum.org.uk

St Jude Children's Research Hospital. (n.d.). History of HPV Vaccination. St Jude Children's Research Hospital sjr-redesign.stjude.org

Tulchinsky, T. H., & Varavikova, E. A. (2014). The new public health. Academic Press.

Tulchinsky, T. H. (2018). John Snow, Cholera, the Broad Street Pump; Waterborne Diseases Then and Now. Case Studies in Public Health, 77. doi: 10.1016/B978-0-12-804571-8.00017-2

UK Parliament. (2026). The 1848 Public Health Act. UK Parliament www.parliament.uk

U.S Department of Health and Human Services Office of Minority Health. (2025). American Indian and Alaskan Native Health. HHS/OMH www.minorityhealth.hhs.gov

U.S. Department of Health and Human Services. (2022). What is the difference between isolation and quarantine? USDHHS www.hhs.gov

Wikipedia. (2025). Miasma Theory. Wikipedia www.en.wikipedia.org

Wikipedia. (2025). 1854 Bread Street Cholera outbreak. Wikipedia www.en.wikipedia.org

World Health Organization. (2024). WHO Covid-19 Dashboard. WHO www.data.who.int

World Health Organization. (2026). History of Smallpox vaccine. WHO www.who.int

This page titled 1.2: History of Public Health is shared under a Public Domain license and was authored, remixed, and/or curated by Fabiane Morales.

- 3.2: Early Community Health Measures by Erin Calderone is licensed CC BY 4.0.
- 3.3: Medieval Public Health by Erin Calderone is licensed CC BY 4.0.
- 3.3.1: The Black Death by Erin Calderone is licensed CC BY 4.0.

1.3: Public Health vs Personal Health

Now that you understand that public health involves making health decisions that affect a population to prevent illness, improve physical well-being, and increase lifespan, let's compare it to personal health. First, note that personal health is entirely about the individual. It encompasses decisions one makes about their health and, ideally, aims for the same outcomes as public health: preventing illness, improving physical well-being, and increasing lifespan. There are currently eight main components of health (Stoewen, 2017):

- **Physical Health**: health achieved through the physiological well-being of the body's organ systems.
- **Psychological Health**: health achieved through mental and emotional stability in challenging situations.
- **Social Health**: health achieved through well-being through supportive and stimulating social connections.
- **Intellectual Health**: health achieved through the use of problem-solving and critical thinking to navigate life's challenges through analysis, evaluation, and decision-making.
- **Spiritual Health**: health achieved through a belief in a larger life scheme, providing a sense of place and purpose.
- **Environmental Health**: health achieved through the conditions in which the individual lives, works, and plays.
- **Financial Health**: health achieved through making informed financial decisions, setting realistic goals, and planning for short-term and long-term needs.
- **Vocational Health**: health achieved through finding meaningful and fulfilling work that aligns with the individual's values and utilizes his/her talents.

As you noted above, personal health focuses solely on the individual, whereas public health focuses on the population; the view of health is broader. Therefore, with this fundamental difference in mind, the approach is different.

It is also important to notice that personal health involves healthcare. Although health is often viewed through the lens of healthcare, it is connected to public health, primarily through prevention, population health, and policy. To clarify, while public health focuses primarily on population-level primary prevention, the healthcare industry meets the needs of individuals and communities for primary, secondary, and tertiary care. Access, cost, and quality of healthcare are all important factors for population health. Public health professionals may work within or adjacent to the medical field, or in policymaking at the local, state, or national level, and should therefore understand the history, current needs, and political climate surrounding healthcare.

Determinants of Health

In public health, the term '**determinants**' refers to the underlying factors, or root causes, that contribute to the development of disease. Unlike contributory causes, determinants delve into factors that shape health over the long term, sometimes years before a disease becomes apparent. The following is a list of seven determinants of health (U.S. Department of Health and Human Services, n.d.):

Behavior

This category entails actions that affect disease risk by increasing or decreasing exposure to harmful factors. Some examples of behaviors that affect the development of disease are smoking, consuming excessive alcohol, having unprotected intercourse, and a lack of exercise and a nutritious diet.

Infection:

This category often refers to infections that cause disease. The most well-known infectious agent that cause disease is the Human Immunodeficiency Virus (HIV) that causes Acquired Immunodeficiency Syndrome (AIDS), however other examples are to this effect is the the *Helicobacter pylori* bacteria infection is one cause of stomach ulcer disease, another is Hepatitis C virus which often causes liver disease, and most recently some variant of the Human Papillomavirus (HPV) has been correlated to cause cervical, vaginal, and penile cancer.

Genetics:

This category encompasses all the genes passed down from parents, including human traits and potential diseases. It is interesting to note that research shows that although genetics contributes to disease, other factors are often influential. For example, if the family has a propensity for diabetes, many times a person can have this in mind and change their lifestyle to include exercise and eating habits that keep diabetes from developing. However, in other cases it is not as preventable, for example, if one of a person's parent has genetic traits that carry Huntington's disease, a person has a 50% chance of developing the disease. In most cases, symptoms begin in adulthood and can be managed with medication, but the neurological decline is imminent (Mayo Clinic, 2025).

Geography:

This category plays a significant role in determining the frequency of exposure and, therefore, of developing diseases. Examples of this include not only infectious diseases such as malaria and Lyme disease, but also environmental factors such as the presence of high levels of radon, which is one cause of lung cancer. In some instances, the geography and environment category may overlap; however, the outcome is the same: disease development.

Environment:

This category views environmental factors as the underlying cause of disease and can be further subcategorized into the **natural** and **built** environments. In natural environments, phenomena such as fires, earthquakes, and flooding can cause diseases. In the built environment, human activities such as industrial production, agriculture, mining, and waste disposal can lead to exposure to toxic substances in the air, water, and soil. A few examples of toxic environmental actions that can promote disease include pesticide use in farming, factory emissions, and improper waste management, all of which can contaminate food and drinking water with hazardous chemicals.

Medical Care:

This category focuses on access to medical care, with an emphasis on prevention, which directly affects disease development. An example of preventive medical care is vaccination. If we look into the controversial topic of COVID-19 vaccination through the lens of public health, it will be noticed that it was mandated that the population be vaccinated with the aim, not only to lessen the degree of virulence of the infection and prevent more deaths, but also to provide **herd immunity** to those who were unable to be vaccinated. In the end, it saved lives. Another example of how preventive medical care saves lives is through early detection screenings. The U.S. Preventive Services Task Force provides research-based recommendations for medical professionals. The recommendations include screenings that help the population prevent the development of diseases such as cancer and diabetes (U.S. Preventive Services Task Force, n.d.)

Social:

This category stems from how people and groups interact within a community. The quality of one's social connections—with family, friends, colleagues, and community—significantly influences overall health and well-being. One example is urban communities, characterized by their fast pace, which show a higher prevalence of stress-related illnesses than the more leisurely rural settings. In contrast, those living in rural communities typically have reduced access to quality healthcare resources, such as hospitals and medical specialists, which are more readily available in urban areas. Social interaction is critical to well-being, and research shows that both the quantity and the quality matter. One example of this is that the isolation measures implemented during the COVID-19 pandemic significantly contributed to mental health issues within communities.

Cultural and Religious:

This category encompasses factors shaped by a society's established norms and values, both formally defined and implicitly understood. It is becoming increasingly clear that cultural and religious factors are determinants of diseases as they sway treatment decisions, thereby affecting disease progression. Religions hold various stances on health, impacting medical treatment, dietary practices, and substance use. Some prohibit immunizations or physician care, others follow dietary laws like Kosher, and some use substances like peyote in religious ceremonies.

Socioeconomic:

This category examines socioeconomic status, which in the United States is defined by education, income, and occupation. Socioeconomic status is a powerful predictor of health, with those in lower groups experiencing worse health outcomes across all racial demographics. For example, it is seen that socioeconomic status determines various diseases observed in the population, such as breast cancer and tuberculosis.

Social Conditions:

Social conditions of the determinants of health 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 strongly influence a person's stress levels and health behaviors. Social conditions can affect a person's access to healthcare and their environmental exposures. In this sense, social conditions aren't just *one* factor in shaping health; they are an underlying influence on nearly all the factors.

Social conditions are explored further in a later section on the **Social Determinants of Health**.

Reference

Mayo Clinic (2025). Huntington's disease. Mayo Clinic www.mayoclinic.org

Stoewen, D. (2017). Dimensions of wellness: Change your habits, change your life. National Library of Medicine. The Canadian Veterinary Journal Aug 58(8): 861-862. www.pmc.ncbi.nlm.nih.gov

U.S. Department of Health and Human Services (n.d.). Healthy People 2030. Office of Disease Prevention and Health Promotion. www.odphp.health.gov

U.S. Preventive Services/Task Force. (n.d.). Task Force at a Glance. U.S. Preventive Services www.uspreventiveservicestaskforce.org

This page titled 1.3: Public Health vs Personal Health is shared under a Public Domain license and was authored, remixed, and/or curated by Fabiane Morales.

- 1.5: Public Health and Personal Health by Janey Skinner is licensed CC BY-NC-SA 4.0.

1.4: Approaches to Protect and Promote Health

The primary motivation for addressing social determinants of health is to achieve **health equity**, in which everyone has an equal opportunity to attain good health. It is important to differentiate health equity from health equality; **health equality** means everyone receives the same treatment, regardless of need.

Public health seeks to improve population health; it considers vulnerable populations and the shared concerns of the entire population. A **vulnerable population** refers to groups of people who have an increased risk of poor health outcomes due to various factors. These factors can make them more susceptible to illness, injury, and premature death. These risks are often tied to social, economic, environmental, and biological factors, such as age, socioeconomic status, and housing status. Identifying vulnerable populations is crucial for public health initiatives because it allows for targeted interventions, resource allocation, and health equity.

When discussing public health concerns affecting the entire population, we refer to health issues that affect everyone in a community or society, regardless of individual differences. These concerns, if left unaddressed, can adversely affect the well-being of the entire population. In essence, "mutual concerns" highlight the interconnectedness of health within a population and the need for collective action to protect everyone's well-being. For example, some shared risks are not limited to specific groups but are prevalent throughout the population. Specifically, we can view this in terms of access to clean water, food safety, and infectious disease outbreaks such as COVID-19. Public health aims to address these concerns by monitoring health trends, implementing interventions, developing regulations, educating to raise awareness, and building infrastructure that supports healthy living.

In recent years, significant shifts in population demographics have affected disease patterns. These changes, which we'll refer to as demographic, epidemiological, and nutritional transitions, have important implications for health outcomes throughout the 21st century (Bongaart, 2009)

Demographic Transition:

A shift in disease patterns from infectious to chronic, non-communicable diseases. For example, low birth and death rates contribute to population growth; this is most evident when the birth rate exceeds the death rate. A well-known example of this is Japan's population. Japan has a small young population and a large older population. The heavy societal burden on older adults may become a public health concern. Similarly, in the United States, there is a growing trend in the elderly population, although it is slower than in Japan (Elder Health in the US will be discussed in section 4.5.4).

Epidemiological Transition:

The epidemiological transition refers to the shift in the leading causes of death in a population as a society develops. Initially, less developed societies experience high rates of infectious diseases, malnutrition, and childhood illnesses. As a country progresses socioeconomically, these communicable diseases decline, and chronic, non-communicable diseases like heart disease, cancer, and diabetes become the primary health concerns.

Nutritional Transition:

The nutritional transition denotes a global shift from diets lacking essential nutrients to those heavily reliant on processed foods. This movement creates a challenging scenario where the consequences of both undernutrition and overnutrition will continue to affect public health for decades to come.

Reference

Bongaarts, J. (2009). Human population growth and the demographic transition. Philosophical Transactions of the Royal Society B: Biological Sciences, 364(1532), 2985. doi: 10.1098/rstb.2009.0137

This page titled 1.4: Approaches to Protect and Promote Health is shared under a Public Domain license and was authored, remixed, and/or curated by Fabiane Morales.

1.5: 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 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 plenty of fruits and vegetables reduces a person's risk 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, and in our communities -- to promote health.

This page titled 1.5: Risk Factors and Protective Factors is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 1.7: Risk Factors and Protective Factors by Janey Skinner is licensed CC BY-NC-SA 4.0.

1.6: The Healthy People Initiative 1990-2030

The Healthy People Initiative began in 1979 following Surgeon General Julius Richmond's report, “Healthy People: The Surgeon General’s Report on Health Promotion and Disease Prevention” (Office of Disease Prevention and Health Promotion, 2025). Each decade, the initiative sets targets to improve various areas of public health and measures outcomes to determine whether those targets have been met. The overarching goals have evolved over the years, but most have aimed to reduce or eliminate health disparities and promote health for all across the lifespan. The 3-minute video that follows will provide an overview of Healthy People 2030 and its five main goals.

Healthy People 2030

The 3-minute video overview of Healthy People 2030 and its five main goals:

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

Presentation of the Healthy People 2030 video, which explains the five main key areas of Healthy People 2030. Caption available.

The Healthy People 2030 initiative uses data from more than 80 federal and non-federal data systems to track progress toward its objectives (including those related to the social determinants of health (SDOH) covered in the next section). These data sources include national censuses (such as the National Vital Statistics System), surveys (such as the National Health Interview Survey), and other reliable data systems (such as the state Tobacco Activities Tracking and Evaluation System) (Office of Disease Prevention and Health Promotion, n.d.). The list of Data Sources used to gather data for Healthy People 2030 can be viewed on the U.S. Department of Health and Human Services website.

The Healthy People 2030 objectives describe measurable outcomes that are attainable in a 10-year period. For example, beyond the general Healthy People 2030 (HP2030) goal of people attaining healthy, thriving lives and well-being free of preventable disease, disability, injury, and premature death, HP2030 established specific, measurable goals and objectives. The Healthy People 2030 Objective MICH-01 is to reduce the rate of fetal deaths at 20 or more weeks of gestation from 5.9 to 5.7 per 1000 live births (objective set in 2017). This objective is an example of public health success. Every 10 years, the objective is reassessed, and a new attainable objective for the next 10-year period is set. 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. The public can easily see how the plan is improving, staying the same, or getting worse relative to the measurable objectives. Here is a page on pregnancy and childbirth.

The developers of Healthy People 2030 have created a set of Tools for Action to support state and local public health departments and independent community organizations in using HP2030 objectives to set their priorities and implement proven health strategies. 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

Healthy People 2030 and the Social Determinants of Health

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. There is also a new focus in the 2030 health literacy objectives: the ability to find, understand, and use information to make well-informed health decisions. An emphasis is also placed on health organizations' responsibility to provide equitable access to health information and to 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.). Reports and meetings that share evidence-based practices, enabling public health workers to learn from others' experiences and improve health outcomes more quickly. Note that the previous plan was HP 2020, and you may still see references to it in our textbook and some Lessons. (Before that were HP 2010, HP 2000, and HP 1990!)

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

> Take a moment to explore the Healthy People 2030 website.

Reference

Office of Disease Prevention and Health Promotion. (n.d.). Healthy People 2030. US Department of Health and Human Services www.odphp.health.gov/healthypeople

Office of Disease Prevention and Health Promotion. (2025). History of Healthy People. US Department of Health and Human Services www.health.gov

Office of Disease Prevention and Health Promotion. (n.d.). Social determinants of health - Healthy People 2030. US Department of Health and Human Services www.health.gov

Office of Disease Prevention and Health Promotion (n.d.). Data sources and methods. US Department of Health and Human Services www.odphp.health.gov

This page titled 1.6: The Healthy People Initiative 1990-2030 is shared under a CC BY 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 3.8: The Healthy People Initiative- 1990-2030 by Erin Calderone is licensed CC BY 4.0.
- 1.12: Twenty-First Century Public Health by Janey Skinner is licensed CC BY-NC-SA 4.0.
- 3.3: Healthy People 2030 and the Social Determinants of Health by Janey Skinner is licensed CC BY-NC-SA 4.0.

1.7: Social Determinants of Health

In section 1.3 (Public Health vs Personal Health), we discussed the Determinants of Health and its subcategory, the Social Determinants of Health. In this section, we will examine the Social Determinants of Health in greater depth.

As a quick review:

A determinant of health is a factor that influences health or the absence of health. There are different types of determinants of health – a person's genetics, for example, can be an important determinant of their health- this is 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 of 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**".

Social Determinants of Health

The **Social Determinants of Health** "are 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, n.d.). By analyzing and extrapolating data from large databases, such as the County Health Rankings, which provide data for nearly every U.S. county, researchers conclude that achieving the most impactful health outcomes requires prioritizing the social and economic determinants of health (Hood et al., 2016). The most widely used framework for the Social Determinants of Health is Healthy People 2030 (covered in the previous section), which sets data-driven national objectives to improve health outcomes and equity.

As you will notice in the next chapter (Evidence-Based Public Health), one way public health obtains the data on population health is through various surveillance and databases. These surveillance systems and databases are often used for other objectives (not public health), but public health officials can use the available data to extrapolate information about the population's health and needs. It is important to note that research drives our definition of health. As we improve at identifying the structural barriers that hold people back, the Social Determinants of Health framework expands, ensuring that our health strategies keep pace with a changing world. As of the beginning of 2026, the following is the most current information.

The data in Healthy People 2030 come from more than 80 indices. To illustrate the magnitude and validity of the data, the following publicly available indices are provided (Office of Disease Prevention and Health Promotion, n.d.; Bensken et al., 2023).

The Social Vulnerability Index aims to identify communities that may need support in preparing for hazards or recovering from disasters. A visual of this index's findings is shown in Figure 1 below (Centers for Disease Control and Prevention, 2024). The findings four key domains and subcategory: one, socioeconomic status (poverty level below 150%, unemployed, housing cost burden, no high school diploma, no health insurance), two, household composition (aged 65 & older, aged 17 & younger, civilian with a disability, single parent, english language proficiency), three, racial and ethinic minority (Hispanic or Latino, Black or African American, Asian, American Indian or Alaskan Native, Native Hawaiian or Pacific Islander, and two or more races), and, four, housing and transportation (multi-unit structures, mobile homes, crowding, no vehicle, group quarters). The Social Vulnerability Index translates broad social determinants of health into a measurable, location-based score. It maps how factors such as housing and poverty affect a community's capacity to manage crises, translating abstract social conditions into actionable data on local vulnerability. By mapping the prevalence of negative social determinants, the Social Vulnerability Index helps public health departments translate broad data into targeted, high-impact resource allocation (Harvard University, 2026).

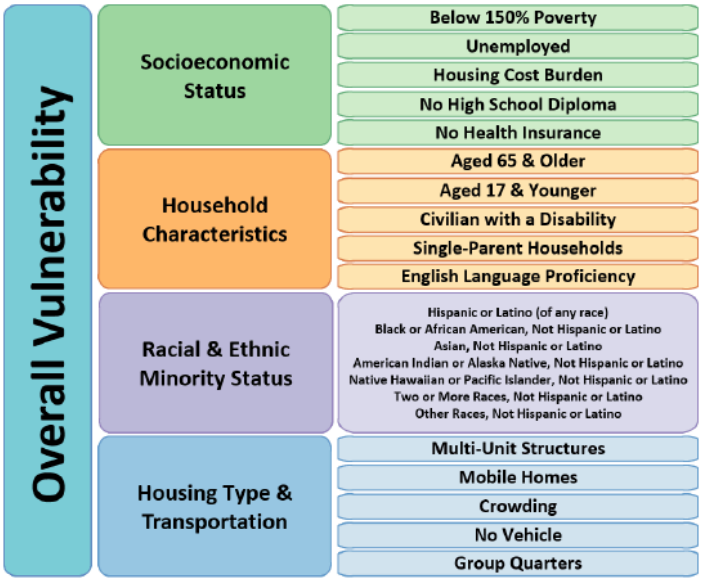


Figure 1.7.1: Social Vulnerability Index variables grouped into four themes. (Public Domain; CDC)

- **Opportunity Index:** the key domains are economy, education, health, and community. The primary objective is to assess how opportunities are distributed and accessed across the country. The primary focus of the Opportunity Index in Healthy People 2030's Social Determinants of Health is economic stability, neighborhoods, and the built environment.
- **Social Determinants of Health Database:** the key domains are social (demographic, age, race/ethnicity, segregation, living conditions) and economic (workforce, employment, poverty, income), education, physical infrastructure (environment, crime, housing, food access, transportation) and healthcare (access, health insurance status, health behaviors, health status, health status mortality). The goal of the index is to address emerging health issues and contribute to health outcomes.
- **Healthiest Communities:** the key domains are population health (access to care, health behavior, health conditions, health outcomes, mental health), equity (education, equity, health equity, income equity, social equity), education (educational achievement, educational infrastructure, educational participation), economy (employment, income, opportunity), housing (housing affordability, housing capacity, housing quality), food and nutrition (food availability and nutrition), environment (air and water, natural environment, natural hazards) public safety (crime, injuries, public safety capacity), community vitality (community stability and social capital), and infrastructure (community layout, transportation). This database is provided by U.S. News in collaboration with the Aetna Foundation (American Public Health Association, n.d.), and the rankings are available at the U.S. News Healthiest Communities Rankings. The goal of the index is to compare health metrics across counties and county equivalents.
- **The US Prosperity Index:** the key domains: inclusive societies (safety and security, personal freedom, governance, social capital), open economies (business environment, infrastructure, economic quality), and empowered people (living conditions, health, education, natural environment). The goal of the index is to assess whether a jurisdiction fosters an environment in which individuals can reach their full potential.
- **PLACES index**: This CDC web tool, a joint venture with the Robert Wood Johnson Foundation and the CDC Foundation, provides a comprehensive overview of chronic disease and health metrics for every U.S. county. Established in 2015, the project employs small-area estimation to produce vital data for census tracts, ZCTAs, and incorporated places. These estimates are essential for identifying health trends in local areas of all sizes, ensuring that both urban and rural populations are accurately represented (Centers for Disease Control and Prevention, 2025). You can explore the PLACES interactive index map.

A report by Whitman *et al.* (2022) summarizes what research analysis has been indicating:

> "Despite significant investments to improve access to high-quality health care, health inequities in the United States persist by race, ethnicity, sexual orientation, gender identity, and disability, as well as by economic and community level factors such as geographic location, poverty status, and employment. Black, Latino, American Indian and Alaska Native (AI/AN), Asian American, Native Hawaiian, and Pacific Islanders (AANHPI), and LGBTQ+ individuals, people who live in

> rural areas, and people with disabilities fare worse than their White, heterosexual, and urban counterparts and people without disabilities. These disparities exist for many health outcomes, including infant and maternal mortality, heart disease, diabetes, hypertension, chronic illness, disability, cancer, mental illness, substance use, and overall life expectancy."

The social determinants of health framework benefits the whole population because it focuses on conditions in which all people are born, grow, live, work, and age; however, through the above databases, indices, and above quoted summary we are able to notice the population with the greatest need (those experiencing health inequilities due to poverty, discrimination, and unequal access to resources), and resources are able to be allocated to reduce health inequities among these social groups in an attempt to promote health equity. The social determinants of health in Healthy People 2030 are a useful framework for action on health equity. The five domains in the Healthy People 2030 Social Determinants of Health are (Centers for Disease Control and Prevention, 2024; FrameWorks, 2023):

Economic Stability:

Economic stability connects wealth to wellness. It highlights how factors such as poverty, employment, and housing underpin a person's physical and mental health. In other words, financial security is a significant determinant of physical well-being. While higher, predictable incomes facilitate access to health-positive resources like quality medical care and fitness facilities, chronic financial strain triggers a toxic stress response. The resulting prolonged elevation of stress hormones is a known contributor to chronic conditions, including hypertension, cardiovascular disease, and various forms of cancer.

Education Access and Quality:

The trajectory of a person's education often mirrors the trajectory of their health. By evaluating milestones such as early childhood development, literacy, and degree completion, we can better understand how educational opportunities (or their absence) shape physical and mental health. Learning is a lifelong health driver. Educational quality determines career success and financial stability, which, in turn, shape a person's environment and access to health care. Strong schools do more than teach; they anchor the community and build collective well-being.

Health Care Access and Quality:

Healthcare access is more than just having a doctor; it's about navigating the system. This field examines how insurance coverage, health literacy, and language barriers determine whether people receive the care they need to maintain health. Quality healthcare is a societal fuel. When everyone can access timely medical care—regardless of their bank account—families and economies thrive. Conversely, delayed care leads to preventable illnesses and skyrocketing costs. To build a prosperous community, we must dismantle barriers such as high costs, language barriers, and systemic discrimination, ensuring that the system serves everyone effectively.

Neighborhood and Built Environment:

Our surroundings dictate our health. This domain examines how infrastructure—such as safe housing and reliable transit—interacts with environmental factors, including clean air, clean water, and access to fresh food. When we address community safety and environmental quality, we create a landscape where health is a natural outcome, not an uphill battle. For example, thoughtfully planned and well-maintained neighborhoods provide a foundation for wellness, whereas neglect undermines it. For instance, something as simple as poor lighting can discourage walking, leading to a decline in physical activity and a rise in chronic illness. To build a thriving society, we must ensure every neighborhood is intentionally designed to support the safety and movement of the people who live there.

Social and Community Context:

Our health is deeply influenced by the social fabric of our communities. This pillar examines how community cohesion and civic engagement are constrained by systemic barriers such as racism, discrimination, and workplace stress. It also addresses how incarceration and immigration status—particularly for those from developing nations—can fundamentally alter a person's physical and mental well-being. Our relationships are a vital source of our health. Strong social ties provide the support needed to navigate life's challenges, while isolation leads to a decline in both mental and physical vigor. Public policy plays a quiet but critical role

here: well-maintained parks and vibrant communal spaces invite interaction, whereas neglected areas drive people apart. To achieve true health equity, we must design our communities to foster the human connections we all need to thrive.



Figure 1.7.2: The five social determinants of health domains. (Public Domain; CDC)

Things to consider:

It is important to notice that the above information is evidence-based and focused; however, there are some nuances to be aware of. 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. Another point to consider is that our individual position in society is the best predictor of our lifespan. Wealth, education, and job status create a health gradient where the top tier enjoys the best outcomes, while the risk of early death doubles for the middle class and quadruples for those at the bottom. This 'class effect' is so powerful that it transcends individual habits; the systemic advantages of being at the top can actually outweigh the biological risks of behaviors like smoking (California Newsreel, 2008).

To achieve lasting change, we must recognize that health is not merely a product of medical care but a reflection of the fairness of our social systems. The Social Determinants of Health—from the stability of our bank accounts and the quality of our schools to the safety of our air and the strength of our community bonds—form the invisible foundation of our well-being. When these systems are inequitable, they create a "toxic stress" that no doctor can prescribe away. The solution lies in a human-centered approach to policy that prioritizes **health equity** as a universal right. By advocating for living wages, universal early education, and inclusive urban design, we shift our focus from treating disease to cultivating wellness. Investing in the human factor means building a society where every person has the resources and the dignity to thrive, ensuring that a healthy life is determined by our shared humanity rather than our zip code.

Reference

American Public Health Association. (n.d.). Healthiest Communities. APHA www.apha.org

Bensken, W.P., McGrath, B.M., Gold, R., & Cottrell, E.K. (2023). Area-level social determinants of health and individual-level social risks: Assessing predictive ability and biases in social risk screening. Journal of Clinical and Translational Science. Nov 10;7(1):e257. doi: 10.1017/cts.2023.680

California Newsreel. (2008). Ten things to know about health. National Minority Consortia www.unnaturalcauses.org

Centers for Disease Control and Prevention. (2024). Research Summary: Social Determinants of Health. CDC www.cdc.gov

Centers for Disease Control and Prevention. (2024). Social Vulnerability Index. ATSDR Place and Health- Geospastial Research, Analysis, and Services Program (GRASP) CDC www.atsdr.cdc.gov

Centers for Disease Control and Prevention. (2025). About PLACES: Local data for better health. CDC www.cdc.gov/places/about/index

FrameWorks. (2023). Explaining the Social Determinants of Health. FrameWorks www.frameworksinstitute.org

Harvard University. (2026). Social Vulnerability Index. Harvard University www.repository.gheli.harvard.edu

Hood, C. M., Gennuso, K. P., Swain, G. R., & Catlin, B. B. (2016). County Health Rankings. American Journal of Preventive Medicine February 50;2 129-135 www.ajpmonline.org

Iton, T. (2020). "Tell me your zip code and I will tell you how long you will live." Medium www.dr-tonyiton.medium.com

Office of Disease Prevention and Health Promotion. (n.d.) Social Determinants of Health. US Department of Health and Human Services www.odphp.health.gov

Office of Disease Prevention and Health Promotion (n.d.). Data sources and methods. US Department of Health and Human Services www.odphp.health.gov

Whitman, A., De Law, N., Chappel, A., Aysola, V., Zuckerman, R., & Sommers, B. D. (2022). Addressing Social Determinants of Health: Examples of successful evidence-based strategies and current federal efforts. Office of Health Policy/Assistant Secretary for Planning and Evaluation www.aspe.hhs.gov

This page titled 1.7: Social Determinants of Health is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 3.2: What are "social determinants of health?" by Janey Skinner is licensed CC BY-NC-SA 4.0.

2: EVIDENCE-BASED PUBLIC HEALTH

We often use the term “evidence-based practice” in public health to refer to policies, programs, or healthcare services. A lot of people have what seem to be great ideas for solving health problems, but how do we know if these ideas will really work? This is especially important when it comes to funding with government grants, which are taxpayer dollars - we need to make sure that we’re not just throwing money at random ideas and hoping they are effective. The following pages will explore how we use evidence-based practices in public health.

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

2.2: Burden of Disease and Epidemiology

2.3: Vital Statistics

2.4: Health Disparities and Inequalities

2.5: Types of Population Studies

2.6: Observational Studies

2.7: Experimental Studies

2.8: Etiology and Contributory Cause

2.9: Program Planning

- 2.9.1: Program Planning - Needs Assessment
- 2.9.2: Program Planning - Goals and Objectives
- **2.9.3: Program Planning - Implementing an Intervention**
  - 2.9.3.1: Recommendations
  - 2.9.3.2: Primary, Secondary and Tertiary Intervention
- 2.9.4: Program Planning - Evaluation
- 2.9.5: P.E.R.I.E. Process

This page titled 2: Evidence-Based Public Health is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

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

Evidence-based public health relies on epidemiological data and research. In this chapter and the next, we will examine key aspects of epidemiology and its relation 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 as possible on the problem and potential solutions, assess how well that evidence applies to the current problem, and use this knowledge to guide decisions about whether and 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 has already been proven 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 from 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 observer or the interviewee.

In practice, objective evidence is often valued more highly than subjective evidence, largely because well-designed research uses multiple methods to reduce bias and misinterpretation. Objective data is also more reliable than individual experiences or opinions. For example, a community member might believe homelessness is not a problem in their city because they used to see many tents and makeshift shelters on the neighborhood sidewalks, but the sidewalks have recently been cleared. The objective data may show a more complex picture: perhaps the individuals who had been living in those makeshift shelters were forced to relocate but remained unhoused.

It is important to consider the following:

- 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 community stakeholders or from public health workers' professional experience 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 exclude certain populations, or we may not yet have research on a specific health problem. Therefore, it’s important to consider all sources of evidence when using an evidence-based approach to public health.
- As we seek to address health problems with evidence-based practice, we must also consider how long it may take to generate evidence through research and the risks of waiting for an abundance of evidence before taking 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 (Hill, 1965, p. 300):

    > "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."

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 2.1.1: Domains that influence evidence-based decision making. Note that decision-making involves considering all four domains: the environment, the best available research evidence, resources (including experts' point of view), and the population's characteristics, values, needs, and preferences. Jacobs et al. (2012).

Reference

Centers for Disease Control (2024). Current cigarette smoking among adults in the United States. CDC www.cdc.gov/tobacco

Centers for Disease Control. (2024). About E-cigarettes (vapes). Smoking and tobacco use. CDC /www.cdc.gov/tobacco/e-cigarettes/about

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

Jacobs, J. A., Jones, E. Gabella, B.A., Spring, B, Brownson, C. (2012). Tools for implementing an evidence-based approach in public health practice. Preventing Chronic Disease; 9:110324. dx.doi.org/10.5888/pcd9.110324.

Seabert, D., McKenzie, J., & Pinger, R. (2022). An introduction to community & public health (10th ed.). Jones & Bartlett Learning.

This page titled 2.1: What Does “Evidence-Based Practice” Mean? is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 2.4: What Does “Evidence-Based Practice” Mean? by Erin Calderone is licensed CC BY 4.0.
- 2.5: Evidence Will Evolve by Erin Calderone is licensed CC BY 4.0.

2.2: 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 **the burden of disease**, which encompasses the health consequences of disease, including disability and mortality. The burden of disease is a comprehensive measure of a population's health loss, combining the impact of premature mortality (death) and morbidity (living with illness or disability). It quantifies the total impact of diseases, injuries, and risk factors (Roser, Ritchie, & Spooner, 2024). Understanding this burden is crucial for developing interventions and delivering services to control the spread of disease, thereby reducing population health inequities (National Collaborating Centre for Infectious Diseases, 2016).

When assessing the burden of a disease, public health uses epidemiological methods to collect and interpret data. **Epidemiology** is the study of diseases, health states, and health outcomes. Epidemiologists are particularly interested in how diseases and conditions are distributed across populations, in identifying factors that increase or decrease the risk of a particular disease, and in determining 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 remains an essential role for epidemiologists worldwide, particularly as we face new and re-emerging infectious diseases. However, chronic diseases, behavioral health problems, injuries, and violence are now also studied using epidemiology techniques.

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

Reference

Roser, M., Ritchie, H., & Spooner, F. (2024). Burden of Disease. Our World Data www.ourworldindata.org/burden-of-disease

National Collaborating Centre for Infectious Disease. (2016). More than just numbers: Exploring the concept of 'burden of disease". National Collaborating Centre for Infectious Diseases www.nccid.ca/publications

Riegelman, R., & Kirkwood, B. (2025). Public health 101: Improving community health (4rd ed.). Burlington, MA: Jones & Bartlett Learning.

This page titled 2.2: Burden of Disease and Epidemiology is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 6.1: Introduction by Erin Calderone is licensed CC BY 4.0.

2.3: Vital Statistics

Some of the primary data sources that epidemiologists track are births and deaths. These data, known as **vital statistics,** are collected by the government. In the United States, hospitals and health professionals are required to report births and deaths, as well as numerous diseases and conditions; the list of reportable diseases to the Centers for Disease Control is extensive (Medline Plus, 2025). It is important to note that birth and death certificate forms completed by healthcare professionals also include information pertinent to epidemiology, such as demographics, parental information, pregnancy and birth details (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 per 1000 people in a population during a given period.

Fertility rate refers to the number of live births per 1,000 women of childbearing age (15-44 years old). Pregnancy and birth are possible outside that range, but they are much rarer (National Vital Statistics System, 2025).

Natality and fertility rates for a specific population, or comparisons over time, can provide information on whether a population is growing, what resources might be needed (e.g., for maternal and infant care), and trends in family planning and contraceptive use.

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

Mortality refers to the death rate in a particular population, disease, or condition under study. 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 morbidity and mortality rates for different diseases and conditions can inform where public health efforts should focus. 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 with respect to morbidity and mortality is to extend healthy life years for all people and to 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 are, the higher the risk. Therefore, mortality rates for a given population may not always be comparable to those of another population due to differences in age structure. 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 accounted for more than 21% of Florida's residents and only 13% of Alaska's. Instead of using the "crude" or absolute mortality rate, an **age-adjusted** mortality rate will more accurately reflect these outcomes between different populations (Seabert, McKenzie, & Pinger, R, 2022). Age-adjusted mortality rates are used to mathematically control for these differences and enable comparisons of mortality rates across populations. The mathematical methods used to calculate age-adjusted rates are beyond the scope of this text; however, it is important to understand the meaning of these terms 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 a measure that compares two quantities and is expressed as a ratio of the numerator to the denominator. In epidemiological studies, the **numerator** is the number of individuals who are also included in the denominator. When calculating the rate of an event, the numerator denotes the number of times the event occurs; for example, in breast cancer, the numerator is the number of cases. The denominator measures the number of times the event can occur. Epidemiologists often use the entire population as the denominator, but in certain circumstances, they use only the **at-risk population**. 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 a disease within a specified period (Centers for Disease Control, 2022). The 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 with the probability of those who are diagnosed with the disease dying from it, and this is called **the 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 total number of cases of a disease present during a particular time (Centers for Disease Control, 2023). The prevalence rate is important for assessing the burden of disease because it provides the proportion of people with the disease over a given period, thereby helping to identify the need for public health services. It is important to note that a limitation of the prevalence rate is that, in some cases, prevalence may be low because individuals with the disease may have it for a short period, as in 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**

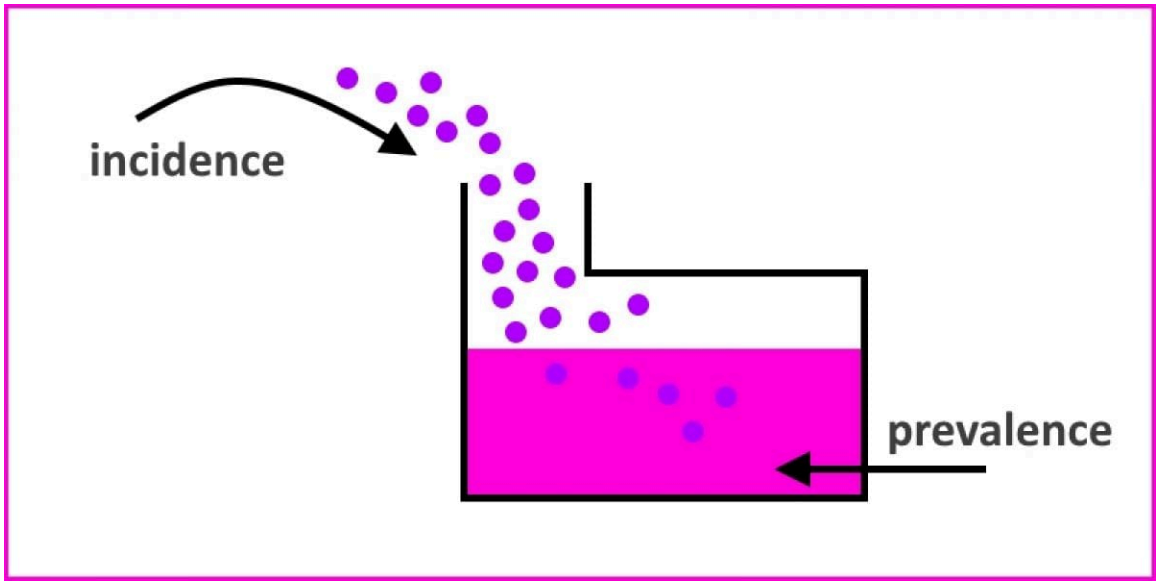


Figure 2.3.1: Relationship between incidence and prevalence; it demonstrates that incidence (the number of new cases) is also found in the prevalence (total number of cases). Free for use under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License; Principles of Epidemiology by H. Giovanni Antunez via Pressbooks

Reference

Centers for Disease Control. (2022). Incidence. National Center for Health Statistics. www.cdc.gov

Centers for Disease Control. (2023). Prevalence. National Center for Health Statistics. www.cdc.gov

Medline. (2025). Reportable diseases. Medline medlineplus.gov

National Vital Statistics System. (2025). Birth Data. National Center for Health Statistics/CDC www.cdc.gov

National Institute of Health. (2024). Cancer Stat Facts: Pancreatic Cancer. National Cancer Institute seer.cancer.gov

Rawla, P., Sunkara, T. & Gaduputi, V. (2019). Epidemiology of pancreatic cancer: global trends, etiology, and risk factors. World Journal of Oncology Feb 26;10(1):10-27 doi: 10.14740/wjon1166

Riegelman, R. & Kirkwood, B. (2025). Public Health 101 (4th). Jones & Bartlett Learning.

Seabert, D. McKenzie, J. F., & Pinger, R. R. (2022). An introduction to community & public health (10th). Jones & Bartlett Learning.

This page titled 2.3: Vital Statistics is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 6.3: Vital Statistics by Erin Calderone is licensed CC BY 4.0.

2.4: Health Disparities and Inequalities

It is important to distinguish between health disparities and health inequalities.

Health Disparities

Health disparities are measurable differences in health outcomes (e.g., incidence, prevalence, and mortality) among specific populations. These health disparities are one reason why HIV, viral hepatitis, STDs, and TB take a greater toll on one population group over another (CDC, 2024). Race and ethnicity are created and shaped by societal perceptions, historical policies, and practices (social constructs) and are related to the Social Determinants of Health covered in section 1.7. Race and ethnicity are both among the main factors in health inequalities (Williams et al, 2010).

Health Inequalities

Health inequalities arise from socioeconomic, 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.

In summary, health inequalities lead to health disparities. Inequalities -unjust, systematic differences in social conditions like poverty, education, and access to care create unfair health outcomes (disparities) for marginalized groups. In essence, inequalities are the cause, and disparity is the measurable result.

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 created and perpetuated structural barriers to achieving long, healthy lives in minoritized communities. This report also uses the term "minoritized groups" rather than "minority or minorities" to emphasize that structures and policies have affected populations, rather than that these disparities result from the size of specific demographic groups. (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 exacerbated by historical or current governmental policies; therefore, a path toward health equity requires new federal policies and accountability (National Academies of Sciences, Engineering, and Medicine, 2023). As discussed in Section 1.7, programs, along with measured objectives and goals, have been developed through the Social Determinants of Health framework in Healthy People 2030.

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 (were state and local statutes enacted in the Southern United States between the late 19th century and 1965 that enforced rigid racial segregation [History, 2026]), and even purposeful public health abuses (such as the Tuskegee Syphilis Study, covered in section 5.1 Bioethics), 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 (National Academies of Sciences, Engineering, and Medicine, 2023):

> "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."

According to an earlier DHHS Health Equity Report from 2019-2020, significant racial disparities in health and the social determinants of health have persisted over the decades. Although measures such as life expectancy and educational attainment

have improved for all Americans, disparities persist across racial groups. Racially minoritized groups have twice (or higher) the poverty rates than 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 that 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 have higher exposure to environmental toxins, such as 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 American Indian and Alaskan Native 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 through 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 within financial institutions. At the same time, home prices in the suburbs continued to rise, keeping loans out of reach for many (Rose, 2023). A majority of communities that were redlined almost a century ago remain low-income, minoritized neighborhoods. Since homeownership is one of the primary mechanisms for building wealth among the middle class, it has 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, its school district receives less funding than a school district with higher home values. In states that have approved them, voucher programs also redirect tax dollars from public schools to private and charter schools, further cutting public school budgets. Schools in lower-income neighborhoods often struggle to attract and retain teachers and may allocate more of their limited resources to safety measures and behavioral interventions rather than to 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), inequities in health opportunities often lead to the disparities observed in health outcomes across groups. In other words, we are recognizing that

differences in how long we live and which diseases affect us (and how seriously we become ill) are more attributable to social, economic, political, and environmental factors than to genetic or biological influences. 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 1 below illustrates the difference between equality and equity through an analogy of a baseball game.

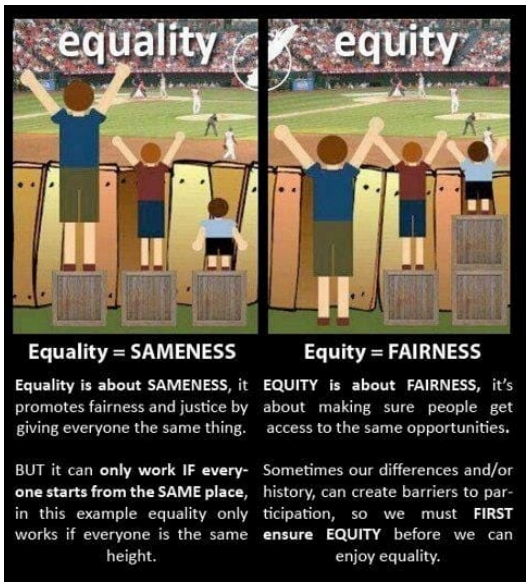


Figure 2.4.1: Equality vs Equity. This educational graphic uses a baseball game analogy to distinguish between equality and equity. Under Equality, three people of different heights each stand on one crate; the shortest person still cannot see over the fence. Under Equity, the crates are redistributed: the tallest person has none, while the shortest has two, allowing all three to see the game. The text defines equality as "sameness" (giving everyone the same thing) and equity as "fairness" (providing specific resources to ensure everyone has the same access to opportunities).

The text reads: "Equality is about SAMENESS, it promotes fairness and justice by giving everyone the same thing. BUT it can only work IF everyone starts from the SAME place, in this example, equality only works if everyone is the same height. EQUITY is about FAIRNESS, it's about making sure people get access to the same opportunities. Sometimes, our differences and/or history can create barriers to participation, so we must FIRST ensure EQUITY before we can enjoy equality."; American Society for Public Administration

Reference

Artiga, S. et al. (2023). Survey on racism, discrimination and health: Experiences and impacts across racial and ethnic groups. KFF www.kff.org

Braveman, P. A., Arkin, E., Proctor, D., Kauh, T., & Holm, N. (2022). Systemic and structural racism: Definitions, examples, health damages, and approaches to dismantling. Health Affairs, 41(2), 171–178. doi.org/10.1377/hlthaff.2021.01394

Doctrow, B. (2022). Racial residential segregation and airborne toxic metals. National Institutes of Health (NIH). www.nih.gov

Health Resources and Services Administration. (2020). HRSA Releases 2019-2020 Report on Health Equity: Special Feature on Housing and Health Inequalities. www.hrsa.gov

History. (2026). Jim Crow Laws. History www.history.com

National Academy of Sciences, Engineering, and Medicine. (2017). Board on population health and public health practice; committee on community-based solutions to promote health equity in the United States. National Academies

Press. www.ncbi.nlm.nih.gov

National Academies of Sciences, Engineering, and Medicine. (2023). Federal policy to advance racial, ethnic, and tribal health equity. National Academies Press. doi.org/10.17226/26834

Reich, R. (2019). How America created its shameful wealth gap. YouTube www.youtube.com

Reich, R. (2022). Reducing health inequities. YouTube www.youtube.com

Reich, R. (2023). Widening Inequalities of Place. YouTube www.youtube.com

Shrider, E. A., & Creamer, J. (2023). Poverty in the United States: 2022. U.S. Census Bureau, Current Population Reports, 60–280. U.S. Government Publishing Office, Washington, DC. www.census.gov

U.S. Department of Health and Human Services. (2024). Healthy People 2030. Discrimination. Office of Disease Prevention and Health Promotion. www.odphp.health.gov

Williams, D.R., Mohammed, S. A., Leavell, J. Collins, C. (2010). Race, socioeconomic status, and health: complexities, ongoing challenges, and research opportunities. Annals of the new York Academy of Sciences. doi: 10.1111/j.1749-6632.2009.05339.x

This page titled 2.4: Health Disparities and Inequalities is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 8.2.2: Racial and Ethnic Health Inequities by Erin Calderone is licensed CC BY 4.0.
- 8.2.3: Systemic Racism by Erin Calderone is licensed CC BY 4.0.

2.5: Types of Population Studies

In public health, we use studies to determine where health interventions are most needed, and, by doing so, we can allocate resources efficiently, implement preventive measures, and address health disparities to improve health outcomes. The three types of studies most used in public health are:

Population comparison studies examine differences in health outcomes across populations; they compare health outcomes (e.g., disease rates, mortality) within and between groups (e.g., geographic areas, ethnic groups, socioeconomic groups). The data used often comes from existing sources such as census data, vital statistics, or health surveys. These studies often use statistical techniques to evaluate data from databases such as electronic health records, registries, or demographic surveys. The purpose is to identify differences in health status across populations, potentially highlighting areas for targeted interventions or further investigation; in addition, these studies are crucial for policy, public health, and understanding long-term population changes.

Observational studies come in many forms, but the researcher is always recording and analyzing information about the subjects, without 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) occurs when studies show a relationship between two or more variables. This relationship may be coincidental, affected by an unknown, or additional research may deem the association false, and/or it could demonstrate a causation (Sudden Unexplained Death in Childhood Foundation, n.d.). In basic terms, the association needs further research to determine whether there is a causal effect. Association does not equal causation.

Causation occurs when studies show that one variable has a direct effect on another, and that effect can be replicated. The most accepted studies that infer causation are the randomized clinical trials (Sudden Unexplained Death in Childhood Foundation, n.d.), which will be discussed in the pages that follow.

Reference

Sudden Unexplained Death in Childhood Foundation. (n.d.). May being a critical consumer of medical research: understanding association versus causation. Sudden Unexpected Death in Childhood Foundation www.sudc.org

This page titled 2.5: Types of Population Studies is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

2.6: Observational Studies

In observational studies, the researcher always records information on the subjects without interfering in any way. Below are the types of observational studies most used in analyzing data to help aid in determining where the need for intervention to bring health to the population:

Ecological studies

These are very basic statistical analyses of the incidence or prevalence of some disease, risk factor, or protective factor within a population or group. These types of studies are helpful for identifying a potentially vulnerable population and/or the need for additional research on particular risk factors.

For example, an ecological study might find that counties with more office workers also have 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 possibility is that office work causes back pain. Two, it could be that people with back pain change careers to 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, which is why it has been recorded more frequently among them than among 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 illustrates that ecological studies can generate ideas for populations of interest or for possible relationships between risks or protective factors and health outcomes. Causation is not proven.

Cross-sectional studies

Cross-sectional studies capture a snapshot of a population at a single point in time.

This can be imagined as a cross-sectional view of a limb in anatomy; it's almost like you're taking a "slice" of the population and looking at the current prevalence of specific risks or protective factors and health outcomes. Often, we may want to conduct a cross-sectional study to identify a specific need within 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 can survey these workers or offer a screening at each office location. The difference between an ecological study and a cross-sectional study is that an ecological study examines prevalence rates within groups, whereas a cross-sectional study uses individual-level data. In our example, we can be sure whether office workers have low back pain.

Cohort studies

Cohort (also known as longitudinal studies) studies are typically much more expensive and time-consuming than other observational studies. A 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 which health outcomes occur. Thus, cohort studies are typically "prospective", meaning they track data forward in time with follow-up data collection within the same cohort. There are "retrospective" cohort studies, but these still begin by identifying exposures or risk factors from historical data within a particular group, and then follow up with this group later to determine outcomes (Celentano & Szklo, 2018).

In case-control studies

In case-control (also known as retrospective) studies, researchers observe existing groups (cases and controls) to identify potential associations between exposures and outcomes.

This study begins by identifying a group of people who have experienced a specific outcome, then examines exposures, health behaviors, or other factors to determine the cause or causes. Looking backwards like this is termed "retrospective". Although we can perform other retrospective studies, case-control studies are always retrospective because they start with the outcome and work backward.

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, no matter the 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 also probably want to know whether they had quit smoking and, if so, how long ago.

There are many issues a researcher must consider when conducting 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 controls can introduce bias into the research.

Another issue is that researchers must control for other variables that could influence the outcome rather than the one being studied. For example, if a researcher wanted to find out whether coffee consumption decreased the risk of obesity, they might recruit a case group of individuals with obesity and a control group of individuals without obesity, and then ask them about their coffee consumption. Maybe people who drink coffee also tend to 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 coffee consumption. Yet another pitfall is reverse causality, in which 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 coffee consumption that affected obesity, but obesity that affected coffee consumption.

Last but not least, all humans tend to have some recall bias. As case-control studies often rely on surveys or interviews, it's important to identify which participants might be inclined to remember or forget certain details, or to fudge some of what they report. For example, many people overestimate their height and underestimate their weight when reporting their own 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 conduct, as data can be collected through interviews, surveys, or databases. They can help a researcher develop or confirm a suspicion, and, if the study is well-designed, they may even allow an association to be inferred. However, they typically need to be replicated and/or corroborated by other study types (such as randomized controlled trials) to establish a causal association. Often, case-control studies may 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 to keep common biases and confounding factors in mind when reading a case-control study.

Reference

Celentano, D. D., & Szklo, M. (2018). Gordis epidemiology. Elsevier Health Sciences.

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. 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. www.researchgate.net

This page titled 2.6: Observational Studies is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 5.5: Types of Research Studies - Ecological and Case-Control Studies by Erin Calderone is licensed CC BY 4.0.
- 5.6: Types of Research Studies - Retrospective or Case-Control Studies by Erin Calderone is licensed CC BY 4.0.

2.7: Experimental Studies

Experimental research includes interventions and randomized controlled trials (clinical trials). When researchers test whether 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 test a metric before and after the intervention to determine whether the experimental protocol or the drug caused a specific outcome. Studies like these often have three steps: a pre-test, the experimental protocol, and then a post-test.

Interventions

Interventions are often conducted to test a drug, medical technique, or health program and determine whether it leads to a positive health outcome.

Let's take a common public health behavioral intervention, like exercise, aimed at improving a health outcome, such as reducing blood pressure. In this example, perhaps we wanted to determine whether offering a free exercise program in a particular community would lower participants' blood pressure readings. We would test participants' blood pressure before offering the exercise program, provide the program for a number of weeks, and then test blood pressure again at the end of the program. Some of these intervention studies are conducted simply to determine whether 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 feasibility. This is called a pilot study. Some interventions and pilot studies include control groups. For our example, including a control group might require measuring blood pressure in subjects from another neighborhood that did not receive the exercise intervention. Control groups are a hallmark of well-conducted interventions because they allow comparison of the experimental condition to a similar situation without the intervention. 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

Randomized controlled trials (RCTs) are a type of experimental study or intervention considered the highest level of research for determining cause and effect. This is for several reasons. First, randomizing subject selection removes selection bias and assumes that the subject pools (experimental and control groups) will be as similar to each other and to 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 it can also be incorporated into the study design.

For example, we measured weight loss in 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 researchers, we would therefore need to take steps in the study design to reduce these confounding factors (such as asking participants not to change their diet or requiring that subjects not be on weight-loss medication to participate in the study). Additionally, many RCTs are blinded or double-blinded, meaning participants and/or researchers are unaware of which group participants are in (experimental or control). This helps eliminate researcher bias (as researchers might unknowingly treat experimental participants differently) and 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 observed in the experimental group could be attributed to the treatment itself, rather than a placebo effect.

Reference

Harvard Health Publishing. (2021, December 1). The power of the placebo effect. Harvard Medical School www.health.harvard.edu

This page titled 2.7: Experimental Studies is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 5.8: Types of Research Studies - Experimental Studies by Erin Calderone is licensed CC BY 4.0.

2.8: Etiology and Contributory Cause

Etiology is a Greek term meaning 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 key criteria (Riegelman & Kirkwood, 2025 pp 35-39):

- At the individual level, the "cause" is associated with the "effect". For example, the "cause" is lung cancer, and the "effect" is being a smoker; it would be required that people diagnosed with lung cancer tend to be smokers as compared with individuals without lung cancer.
- At the individual level, the "cause" comes before the "effect". For example, if the "cause" is not enough sleep and the "effect" is an increased risk of obesity, it would be required that not enough sleep precede the onset of obesity.
- At the individual level, altering the "cause" also alters the "effect". For example, the "cause" is the reduction of cigarette smoking, and the "effect" is lung cancer; it would be required that reducing cigarette smoking also reduces the incidence of lung cancer.
- At the 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 a contributory cause. These studies are case-control, cohort, randomized controlled trials, population comparisons, or ecological studies. Let's look at how the studies help in determining the contributory cause:

- Case-control studies are most helpful in meeting the first requirement: the cause is associated with an effect.
- Cohort studies are most helpful in demonstrating the second requirement: the cause comes before the effect.
- Randomized controlled trials are most helpful in demonstrating the third requirement: altering the cause also alters the effect.
- Population comparisons or ecological studies are most helpful for comparing population incidence between cause and effect.

It is important to note that the above requirement for identifying a contributory cause is the same as the one for establishing **efficacy.** Efficacy is the ability of an intervention to produce the desired positive effect.

There are times when it is not possible to identify a concrete contributory cause, and in those cases, analysis of supporting evidence is needed to establish cause and effect. The most well-accepted criteria are:

- **Strength of the relationship:** This assesses how closely the **risk factor** (what increases the likelihood of a negative outcome) is related 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 who 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 examines whether groups across 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 plausibility:** This assesses whether the disease can be explained by accepted biological mechanisms. Looking at opioid addiction, morphine derived drugs act upon the brain to produce drug liking, tolerance, dependence, and addiction (Korsten & George, 2002).

Much of the above information was obtained from Riegelman & Kirkwood, 2025 pp35-39.

Reference

Korsten, T., George, T. (2002). The neurobiology of opioid dependence: implications for treatment. Science Practice Perspect July 1(1):13–20. www.pmc.ncbi.nlm.nih.gov

Riegelman, R., & Kirkwood, B. (2025). Public Health 101 Improving Community Health (4th ed). Jones & Bartlett Learning LLC.

This page titled 2.8: Etiology and Contributory Cause is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

2.9: Program Planning

For any health intervention to be successful, it should be evidence-based: the rationale, design, implementation, and assessment of the program should be rooted in scientific evidence. However, it may not be possible to simply find a peer-reviewed research article on a successful intervention for a specific health behavior in a similar community and then “copy and paste” that intervention into a new community.

Effective program planning, therefore, involves a thoughtful process that takes into account the specific needs, desires, and capacities of the community, as well as funding, timing, and how the program will be evaluated for efficacy (whether it worked). Most community-based programs are grant-funded and must demonstrate this process to justify the use of those funds.

The generalized model includes four basic steps: conducting a needs assessment, setting goals and objectives, implementing an intervention, and evaluating the intervention.

This page titled 2.9: Program Planning is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

2.9.1: Program Planning - Needs Assessment

The first step in the generalized model is to conduct a needs assessment of the target population or community.

A well-conducted needs assessment provides justification for funding (as most community programs are funded by grants) and can be used to secure buy-in from community members while preventing duplication of existing resources or programs. It can also establish a baseline for goals and objectives, which will need to be measured at the beginning and end of the program (and sometimes mid-program) to evaluate whether the program is working. According to Seabert et al. (2022 p. 127), a needs assessment includes the following 6 steps:

1. **Designing the needs assessment**. This includes determining both the purpose of the needs assessment and how it will be conducted, including the personnel needed. What tools will be used (i.e. surveys, interviews, etc.)? Who is the target population? How long will the needs assessment take to complete? Getting input from community members can be extremely helpful in designing an effective assessment, since they may have insights into the target population's communication preferences and how to recruit the maximum number of respondents.
2. **Gathering data.** Once the purpose and scope of the needs assessment have been decided on, the data must be collected. Two main types of data can be used: primary and secondary. **Primary data** includes surveys, interviews, and other data gathered directly from the target population. **Secondary data** is information gathered from a similar population or the target population, but for a different purpose. This could include nationally representative surveys (i.e. vital statistics, behavior risk factor surveillance system data) or health insurance claims, health risk assessments etc. collected earlier from the target population. Care must be taken to respect the Health Insurance Portability and Accountability Act (HIPAA) Privacy rules for health data.
3. **Data analysis**. Formal statistical analysis is typically performed only in research studies, since it requires more sophisticated software and the control of potential biases and confounding factors. Many program planners do an informal analysis of the data to identify the most pressing problems for the community. Once again, getting input from community members can be invaluable in this process. Often, there are many potential health problems, but a program can only address one or two, so they must be ranked by which problems have the greatest need and can be addressed most easily and effectively.
4. **Identifying risk factors.** After the health problems have been prioritized, the risk factors contributing to them should also be identified. There are three types of factors involved in a behavior:
    a. **Predisposing factors** are those needs that a person has before starting a behavior. For example, knowledge of the health risks of smoking is a predisposing factor for smoking cessation. If someone does not know that smoking poses a risk to their health, they are unlikely to try to quit.
    b. **Enabling factors** are those things that help someone perform the behavior. For example, if someone wants to start exercising, it helps if they have access to a gym, park, walking paths, exercise classes, etc.
    c. **Reinforcing factors** are those that keep a person going with healthy behaviors. Social support, for example, is especially powerful in maintaining a behavior. Reinforcing factors might include workplace wellness programs, recreational clubs, or support groups (like Alcoholics Anonymous).
5. **Setting the focus of the program.** The program planner will now have the information needed to identify the program's direction: which health problems are priorities and which behavioral risk factors will be targeted. The planner should always prioritize the problems and factors that are most important: either because of the severity of the health problem, the number of people affected, or because community members have identified them as important to them. But they also need to prioritize changeable health problems - that is, there is scientific evidence that community interventions can be effective for this problem. Finally, planners should always take into account the available resources (funds, personnel, space, time, etc.). If there are not enough resources to address the problem effectively, then perhaps the particular grant funds they are working with is better used to target another priority problem on the list.
6. **Validating prioritized needs.** Once again, community input can help double-check the assessment results. This also allows the planner to determine whether anything is already being done to address the priority health problem or whether other interventions have been attempted in the past. Additionally, they should check for redundancies or programs that are already addressing that need in the community. Are there ways to support existing, successful programs rather than compete with them?

Reference

Seabert, D., McKenzie, J. F., & Pinger, R. R. (2022). Introduction to community & public health (10th ed). Jones & Bartlett Learning.

This page titled 2.9.1: Program Planning - Needs Assessment is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 13.10.2: Needs Assessment by Erin Calderone is licensed CC BY 4.0.

2.9.2: Program Planning - Goals and Objectives

The goal of a program is the overarching target it aims to accomplish. This is usually stated in a single sentence and encompasses the program's general mission. Below are some examples of program goals:

- To increase the number of adults achieving the minimum physical activity recommendations.
- To help breast cancer patients access social support resources.
- To reduce teen violence incidents in high school.

Goals are written in a very broad and general way, but include both who will be affected (target population) and what will be changed (outcome) (Seabert et al., 2022 pp 120-126).

Objectives are specific outcomes that will lead to achieving the overall goal. Objectives come in different forms and must be written in a very specific way, as they typically describe outcomes that are measured at the beginning and end of the program to determine its effectiveness. Well-written objectives follow the SMART acronym:

- **S** - specific. The objective states specifically what will change, and by how much. It should be stated in quantifiable terms.
- **M** - measurable. The objective needs a metric to be measured at the beginning and end of the program (or part of it). Vague objectives, such as changing things like knowledge or perceptions, can often be measured by validated surveys or tests, which can be quantified (represented numerically) by a score.
- **A** - achievable. The objective must be achievable given the available resources and the baseline measurement. This is where the scientific evidence - studies of previous interventions - can help the program planner set reasonable expectations.
- **R** - realistic. The objective must be realistic for the given timeframe. Not only should these objectives be evidence-based, but they should also be realistically achievable for the target community. If more or fewer resources are available, or if a shorter or longer timeframe is used, this can affect the program's effectiveness.
- **T** - timeframe. All objectives should have an “end date”, or a date by which the objective is re-measured. This may not be the end date of the program itself, particularly if it is an ongoing project, but it will be the target date for completing the objective and evaluating the program.

Exercise 2.9.2.1

Which of the objectives coincide with the SMART acronym?

1. Over the next 6 months, program participants will improve their single-leg balance test scores by 10%.
2. Senior citizens will improve their balance.
3. The community pool will be utilized more by the end of the year.
4. More children will know how to swim at the end of the summer.
5. The employees of the local grocery store chain will have no low back pain complaints by the end of the year.

Answer available at the end of this section.

Reference

Seabert, D., McKenzie, J. F., & Pinger, R. R. (2022). Introduction to community & public health (10th ed). Jones & Bartlett Learning.

Answers

Exercise 2.9.2.1

The first objective is the only one that meets all the guidelines of the SMART acronym. It provides a specific population (program participants), a specific measurement (score on the single-leg balance test), a specific, achievable outcome (improvement by 10%), and a realistic timeframe (6 months).

This page titled 2.9.2: Program Planning - Goals and Objectives is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 13.10.3: Goals, Objectives, and Activities by Erin Calderone is licensed CC BY 4.0.

2.9.3: Program Planning - Implementing an Intervention

Community Intervention Models

The social-ecological model identifies several potential areas for intervention and health promotion within a community at each level of the model. 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 the political powers 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 of which emphasize identifying deficits and needs, and others that emphasize identifying what is already working well, strengths-based. These models work through social action, advocacy, capacity building, grassroots organizing, and leadership development to drive positive change (Seabert et al., 2022).

Community-based health promotion programs often take a holistic approach: they are not limited to a single location (such as a hospital), they often include multiple, coordinated interventions, and they may also focus on environmental and policy changes to support the desired behaviors (Merzel & D'Afflitti, 2003). According to McLeroy et al. (2003), most community-based interventions fall into four major models. Most successful community interventions are not only multi-faceted, but they also utilize more than one of these models.

- Community as a **setting**. Sometimes, the community is simply the geographic location where 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 (such as billboards, paper flyers, radio, TV, or YouTube advertisements) may be used to convey specific health messaging. When the community is the setting, the intervention aims to elicit personal behavioral change. Therefore, any improvement in population health is the sum of all the individual behaviors. This model may fail to address environmental, economic, or political influences on behavior and health.
- Community as a **target**. Interventions that target the community aim to change 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 park space per person or the number of seniors participating in a free lunch program. The assumption is that changing the community environment will improve healthy behaviors and quality of life.
- Community as a **resource**. This approach seeks to leverage the people and resources within the community to 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 leverage and support existing resources, or they might ask community members to identify the highest priority 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" by supporting the community in identifying needs, developing solutions, and implementing them. This model might fail to address the social determinants of health disparities that many communities face, such as economic, environmental, and policy factors.

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) state:

> 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.

Program Intervention Implementation

Once the program has been designed, it's time to put it into action.

Implementing a program may require many smaller administrative tasks and staying organized to ensure the program's different pieces come together smoothly. For example, if personnel must be hired, the human resources (HR) department may need to post a job description, interview potential candidates, and finalize the hiring process. Grant funds may take time to be released and then be encumbered (assigned) to different departments. Equipment may need to be purchased, locations and rooms may need to be reserved or rented, and staff may need to be trained. Once the program gets started, these different moving parts may need to be monitored and outcomes tracked or tested at different times.

Reference

McKenzie, J. F., Neiger, B. L., & Thackeray, R. (2017). Planning, implementing, and evaluating health promotion programs: A primer (7th ed.). Pearson Education.

McLeroy, K. R., Norton, B. L., Kegler, M. C., Burdine, J. N., & Sumaya, C. V. (2003). Community-Based interventions. American Journal of Public Health, 93(4), 529–533. doi.org/10.2105/ajph.93.4.529

Merzel, C., & D'Afflitti, J. (2003). Reconsidering community-based health promotion: Promise, performance, and potential. American Journal of Public Health, 93(4), 557–574. doi.org/10.2105/ajph.93.4.557

Seabert, D., McKenzie, J. F., & Pinger, R. R. (2022). Introduction to community & public health (10th ed). Jones & Bartlett Learning.

This page titled 2.9.3: Program Planning - Implementing an Intervention is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 13.9: Community Intervention Models by Erin Calderone is licensed CC BY 4.0.
- 13.10.4: Implementation by Erin Calderone is licensed CC BY 4.0.

2.9.3.1: Recommendations

One way public health serves the community is through recommendations. These recommendations are based on evidence from studies and analyses of program interventions.

The two main criteria for evidence-based recommendations are the quality of evidence and the magnitude of the impact, and together, a score is given which provides a quantifiable way to verify the recommendation's value:

Quality of evidence

This is based on the types and quality of research conducted. The highest-quality evidence is derived from randomized controlled trials. However, in many cases, case-control and cohort studies have been part of the analysis. Expert opinion may fill gaps and provide ideas for intervention; however, when evaluating the quality of evidence for recommendations, it ranks lowest. The quality of the evidence is scored as good, fair, or poor.

- Good: evidence includes consistent results from well-designed, well-conducted studies.
- Fair: evidence is sufficient to determine effects on health outcomes, but the strength of the evidence is limited by the number, quality, or consistency of the individual studies.
- Poor: evidence is insufficient to assess the effects on health outcomes.

Level of Certainty of Net Benefit

This accounts for the benefits and harms of the evidence (studies) and provides a net benefit score (**benefit - harm = net benefit**). The net-benefit score can be quantified as high, moderate, or low (U.S. Preventive Services Task Force, 2018; Riegelman & Kirkwood, 2025):

- High: The evidence from well-designed, well-conducted studies shows consistent results across representative populations. Future studies. This conclusion is therefore unlikely to be strongly affected by the results of future studies.
- Moderate: The available evidence is sufficient to determine the effects of the preventive service on health outcomes, but confidence in the estimate is constrained by factors such as the number, size, or quality of individual studies, inconsistencies in findings across studies, or a lack of coherence in the chain of evidence. As more information becomes available through more evidence and consistent studies' outcomes, this change may alter the conclusion.
- Low: The available evidence is insufficient to assess effects on health outcomes. Evidence is insufficient because of the limited number or size of studies, important flaws in study design or methods, or inconsistency of findings across individual studies.
- Zero/negative: Evidence shows no net benefit.

Quantifiable Result

These two criteria are combined to formulate a classification of the strength of the recommendation as grades A, B, C, D, and I (U.S. Preventive Services Task Force, 2018; Riegelman & Kirkwood, 2025):

- A = strongly recommended.
- B = recommended.
- C = no recommendation, service needs evaluation on an individual basis
- D = not recommended.
- I = insufficient evidence to make a recommendation.

Table 1 below illustrates how the recommendation above can be presented in tabular form.

Classification of Recommendations
Adapted from United States Preventive Services Task Force (2018).

Quality of the Evidence	Net Benefit High	Net Benefit Moderate	Net Benefit Low	Net Benefit Zero/Negative
Good	A	B	C	D
Fair	B	B	C	D
Poor	I	I	I	I

Exercise 2.9.3.1.1

Using the table of classification of recommendations, indicate how the following evidence should be graded: "Expert opinion suggests a large impact of a new intervention to cure breast cancer."

Answer available at the end of this section.

Exercise 2.9.3.1.2

Using the table of classification of recommendations, indicate how the following evidence should be graded: "On the basis of good evidence, it is concluded that a new treatment cures approximately the same percentage of patients as the standard treatment but has a substantial increase in side effects."

Answer available at the end of this section.

Part of the above information was obtained from Riegelman & Kirkwood (2025).

Reference

Riegelman, R., & Kirkwood, B. (2025). Public Health 101 Improving Community Health (4th ed). Jones & Bartlett LLC.

U.S. Preventive Services Task Force. (2018). Grade definitions. U.S. Preventive Services Task Force www.uspreventiveservicestask.org

Answers

Exercise 2.9.3.1.1
Correct answer: I

Exercise 2.9.3.1.2
Correct answer: D

This page titled 2.9.3.1: Recommendations is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

2.9.3.2: Primary, Secondary and Tertiary Intervention

As explained earlier, evidence-based strong recommendations lead to well-thought-out interventions. One method for analyzing the practicality of an intervention is the **"When-Who-How"** approach (Riegelman & Kirkwood, 2025 p44):

When

When depicts the timing of the disease; it is categorized as primary, secondary, or tertiary interventions.

- Primary intervention occurs before the onset of the disease. The goal is to prevent the disease from developing.
- Secondary intervention: happens after the onset of the disease (or risk factor) but before the onset of symptoms. The goal is to detect early (or reduce the risk factor) while the individual is asymptomatic.
- Tertiary intervention: occurs after symptoms appear but before irreversible damage. The goal is to prevent irreversible outcomes due to the disease.

Let's look at examples. If we look at the opioid crisis and attempt to find a fitting intervention to help either reduce or eliminate the number of overdoses (irreversible damage). The following are examples of primary, secondary, and tertiary interventions: First, educating schoolchildren to prevent drug use, such as Red Ribbon Week, is a primary intervention. Second, knowing that one cause of the opioid crisis is due to overuse of prescription pain medications, an intervention targeting patients taking pain medication and offering a gradual dose reduction program would be an example of a secondary intervention. This intervention is in place before patients experience withdrawal from pain medication (onset of disease). Third, knowing that a community is having issues with illicit drug usage, one intervention could work with the police department to help addicts with rehabilitation programs, such the various Medication-Assisted Treatment (MAT) programs (Mosel, Sharp, & Thomas, 2025) or the Law Enforcement Assisted Diversion (LEAD) program in Seattle (Green, 2018) would be an example of tertiary intervention. This intervention targets individuals who have had symptoms of withdrawal, aiming to reach them before death due to an overdose (irreversible damage).

Who

Who is concerned with the demographics of the intervention. Who is the intervention targeting? It is important to consider who the intervention targets to ensure it is allocated appropriately. Plus, knowing the demographic also helps to analyze the efficacy of the intervention.

How

How is concerned with how the intervention will be implemented. To address behavior change, there are four types of interventions: information (education), motivation (incentives), obligation (requirements), and technology.

- Information (education): the goal is to change behavior through encounters, such as group interactions, social or mass media.
- Motivation (incentives): the goal is to change behavior in anticipation of an upcoming reward.
- Obligation (requirement): the goal is to change behavior, using laws or regulations to enforce it.
- Technology: the goal is to circumvent individual behavior change by facilitating a different way of life. For example, the usage of seat belts or airbags for safety is easier to implement than requiring a change to driving behavior.

Reference

Green, S. J. (2018). LEAD program, aimed at helping instead of punishing addicts, to expand to Burien. Seattle Times. www.seattletimes.com

Mosel, S., Sharp, A., Thomas, S. (2025). Medications for addiction treatment. American Addiction Centers www.americanaddictioncenters.org

Riegelman, R., & Kirkwood, B. (2025). Public health 101: Improving community health (4rd ed.). Burlington, MA: Jones & Bartlett

Learning.

This page titled 2.9.3.2: Primary, Secondary and Tertiary Intervention is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

2.9.4: Program Planning - Evaluation

An important component of any successful program is evaluating it for both its quality and efficacy.

Formative Evaluation

Evaluation occurs throughout all the phases of the program - in fact, the needs assessment is one form of evaluation. If the program includes a pilot test and a phasing-in period, the assessments conducted at each step can also be used to improve the program. This type of evaluation, which assesses the program's quality and makes changes during its implementation, is called formative evaluation (McKenzie et al., 2017; Seabert et al., 2022).

Summative Evaluation

The second type of evaluation is the summative evaluation, which typically takes place at the end of the program (or at a designated time if the program is ongoing). The program's objectives must be assessed to determine whether it was effective. Evaluation of the impact objectives is called **impact evaluation**, and evaluation of the outcome objectives is termed **outcome evaluation**. These evaluations are often presented in a report, which is shared with key stakeholders and decision-makers to justify continued funding, suggest improvements, or provide a rationale for ending the program. Of course, if the evaluation is done by the program planner, there is always the potential for bias and the temptation to portray the outcomes in the most positive light! Therefore, it may be helpful to have an independent evaluation and/or make every effort to remain as objective as possible (McKenzie et al., 2017, Seabert et al., 2022). The Centers for Disease Control and Prevention (CDC) has created a framework to guide program evaluation and ensure it is ethical, accurate, and useful (CDC, 2024).

How are results evaluated?

Specifically, in a public health intervention, how do we evaluate results? The aim of the intervention is to reduce the identified problem. Understanding how much of the problem the intervention solved and the specific nature of what's left is also vital for learning and future action; this is called **effectiveness**. It is important to distinguish between effectiveness and efficacy: efficacy indicates how well an intervention will work under research conditions (Riegelman & Kirkwood, 2025), whereas effectiveness assesses how an intervention has worked in real-world settings and examines its parameters.

Many public health interventions are re-examined through the PERIE process to understand the problem after the intervention, its etiology, and recommendations and options for implementation. The RE-AIM framework aims to understand how well the intervention works and how well it is accepted in practice. These can be examined using qualitative and/or quantitative methods, as they often complement one another. Qualitative methods provide insight into reasons and help predict future intervention needs. Quantitative research in public health often involves large amounts of data focused solely on outcomes (Riegelman & Kirkwood, 2025).

Deciding on the most fitting approach to use is a judgment call. However, it is important to note that many approaches complement one another to provide the assessor with a whole picture. For example, population health approaches (e.g., the PERIE process, RE-AIM) are used in public health, and individual approaches, often used in healthcare, are seen as complementary. The complementary approaches often provide the examiner with a more comprehensive view of the problem, enabling the generation of new hypotheses and the prediction of future intervention needs.

Reference

CDC. (2024). Program Evaluation Framework. CDC www.cdc.gov

McKenzie, J. F., Neiger, B. L., & Thackeray, R. (2017). Planning, implementing, and evaluating health promotion programs: A primer (7th ed.). Pearson Education.

Riegelman, R., & Kirkwood, B. (2025). Public health 101: Improving community health (4rd ed.). Burlington, MA: Jones & Bartlett Learning.

Seabert, D., McKenzie, J. F., & Pinger, R. R. (2022). Introduction to community & public health (10th ed). Jones & Bartlett Learning.

This page titled 2.9.4: Program Planning - Evaluation is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 13.10.5: Evaluation by Erin Calderone is licensed CC BY 4.0.

2.9.5: P.E.R.I.E. Process

The P.E.R.I.E. process is a structured, evidence-based framework that helps to analyze and address public health problems. This involves identifying the problem, understanding the causes, developing recommendations, implementing interventions, and evaluating outcomes. It emphasizes understanding of the problem and its causes. Then it helps identify the appropriate recommendation and how to implement it. It is also important to note that the PERIE process is circular, indicating the need to revise, understand, and revisit the problem over time. According to Riegelman& Kirkwood (2025 p30), there are five questions to ask when applying the PERIE process:

1. **P**roblem: What is the problem?
2. **E**tiology: What is/are the contributory cause(s)?
3. **R**ecommendations: What works to reduce the health impact?
4. **I**mplementation: How can we get the job done?
5. **E**valuation: How well does/do the intervention(s) work in practice?

Let's look at an example of applying the PERIE process by examining Seattle's King County implementation of the Law Enforcement Assisted Diversion (LEAD) program (Green, 2018). In the LEAD program, launched in 2011 in King County, opioid addicts are no longer charged and sent to jail for having a small amount of drugs. Once the users are caught with drugs, they are connected with case workers. The case workers provide support and access to basic needs (food, housing, employment, health care, and treatment). An evaluation of the program has shown a nearly 60% reduction in relapse, and 50 other cities around the world are replicating it (Seattle Channel, 2019).

Opioids are highly addictive pain relievers. Many people start their drug addiction problem due to uncontrolled pain, and after the pain medication is no longer prescribed, some opt to start on street opioid use to help relieve withdrawal symptoms. Independent of how it started, the problem is that the use of opioids is highly addictive, withdrawal symptoms tend to be avoided, and people tend to continue usage. In addition, in street opioid usage, the drugs' dosage is not monitored, or they may be tinted with fentanyl (or other drugs), and overdose and death could easily be the outcome. This is not only an individual problem; it is a societal public health problem, and finding a solution is key to helping people overcome it and be successful in society. The application of the PERIE process as it relates to Seattle's King County is as follows:

What is the problem? Overuse of opioids is a cause of societal issues, overcrowding of jail systems, and straining police enforcement.

What is/are the etiology/contributory cause(s)? Overprescription of painkillers or street usage of gateway drugs both lead to heroin usage.

What works to reduce the health impact (recommendation)? Besides working with prescribing doctors and being more selective when prescribing pain-relievers, working with law enforcement to help drug addicts get the support needed so they stop/minimize drug usage.

How can we get the job done (implementation)? Focus on working with law enforcement to provide support through a case worker and access to basic needs and treatment. Implementing the LEAD program.

How well does/do the intervention(s) work in practice (evaluation)? The LEAD program has been successful. Continued evaluation of the program is recommended.

Reference

Green, S. J. (2018). LEAD program, aimed at helping instead of punishing addicts, to expand to Burien. Seattle Times www.seattletimes.com

Riegelman, R., & Kirkwood, B. (2025). Public health 101: Improving community health (4rd ed.). Burlington, MA: Jones & Bartlett Learning.

Seattle Channel (2016). CityStream: LEAD Program. Seattle Channel www.seattlechannel.org

Seattle Channel. (2019). Law enforcement assisted diversion (LEAD) lunch and learn. YouTube www.youtube.com

This page titled 2.9.5: P.E.R.I.E. Process is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

3: DATA AND COMMUNICATION

In today's information environment, flooded with inaccuracies, falsehoods, conspiracy theories, and scams, there is a need for reliable, accurate health information to stand out as a crucial and increasingly vital public health service.

So, where do we get trustworthy public health information? We might go to the Centers for Disease Control and Prevention (CDC), National Institute of Health (NIH), or World Health Organization (WHO) websites to read the current public-facing guidelines on healthy living, news articles on health discoveries or advancements, or toolkits for doctors, nurses, and community health workers. But let's say we wanted to go deeper and read original research or even find surveillance reports. Where would we look for these types of questions and answers? And, what do we need to know about research processes to understand this type of information?

Health communication in public health involves (Riegelman & Kirkwood, 2025 p64):

- Collecting data
- Compiling information
- Presenting information
- Perceiving information
- Combining information
- Decision-making

In this chapter, we will go over the abundance of health information, determine which is accurate and which is not, understand where public health data comes from, and where to access trustworthy information.

Reference

Riegelman, R., & Kirkwood, B. (2025). Public Health 101 Improving Community Health (4th ed). Jones & Bartlett Learning LLC.

3.1: Where do Public Health Data Come From?

3.2: Public Health Surveillance

3.3: Notifiable Diseases

3.4: Quality of Health Information

3.4.1: Internet, Social Media, and the Age of Algorithm

3.4.2: Credible Sources

3.5: Measuring the Health of a Population

This page titled 3: Data and Communication is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 5.1: Introduction by Erin Calderone is licensed CC BY 4.0.

3.1: Where do Public Health Data Come From?

Where do the statistics presented by news media and health educators come from? In addition to targeted research conducted by the National Institutes of Health (NIH) or universities, there are many freely available data sources for public health practitioners in national, state, and county records. The primary source of national public health information and data is the Centers for Disease Control and Prevention (CDC), an agency of the U.S. Department of Health and Human Services (HHS). Local public health departments may also provide the public with reports on outbreaks and health concerns, as well as information on research, programs, and health services.

Vital statistics (covered in chapter 2) are public records like birth certificates, death certificates, and marriage licenses, or divorce filings. These are reported to the county clerk and often serve as a baseline data source for determining population health status. Each of the 50 states, plus 2 individual cities (New York and District of Columbia), along with the 5 U.S. territories (Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands) is responsible for collecting and maintaining these records. The National Center for Health Statistics (NCHS), which is a part of the CDC, tracks these vital records from each state/territory and produces statistics and reports housed in the National Vital Statistics System (NVSS). Data, graphs, charts, and more detailed reports are available online to the public. For example, we can find data on death rates and causes of death for the previous year, statistics on birth rates for women of different age groups, and reports on life expectancy by state (National Vital Statistics System, 2023).

Certain diseases are classified as **notifiable** (covered in more detail on the following pages) and require doctors, labs, and healthcare workers to report them to health officials. This system of disease **surveillance** (covered in more detail on the following pages) is used to track epidemics and can serve as a data source for epidemiologists to determine attack rates. The list of notifiable diseases changes as novel diseases are discovered and older diseases are managed or eradicated. Some diseases or conditions require immediate investigation and response (such as foodborne disease outbreaks and infectious diseases like Ebola), while others can be reported annually (such as cancers). This data is collected and managed by the National Notifiable Diseases Surveillance System (NNDSS), another division of the CDC (Seabert et al., 2022, p. 66). To determine its priorities for health investigations and research, the CDC publishes a weekly report called the Morbidity and Mortality Weekly Report (MMWR).

The National Center for Health Statistics is also the hub for several national health surveys, and the following are a few examples:

1. The **National Health Interview Survey (NHIS)** has been conducted continuously since 1957 and provides the largest in-depth cross-sectional analysis of population health. The NHIS consists of an interview-style survey that is updated every 15-20 years and administered to randomly sampled households in all 50 states. Individuals not included in these samples are incarcerated individuals, residents of long-term care or nursing homes, and those without housing (National Health Interview Survey, 2024).
2. In the early 1960s, the **National Health and Nutrition Examination Survey (NHANES)** began as a project of the NCHS and has continued ever since. This survey includes an interview and medical, dental, and psychological assessments conducted with a nationally representative sample of 5,000 people. The data from this survey can be used by epidemiologists to study various diseases, health risks, and dietary habits. This project has also helped to develop specific health measurement standards, such as healthy and hypertensive blood pressure ranges. Results can also inform policies and programs to improve health outcomes.
3. For adolescents, the **Youth Risk Behavior Surveillance System (YRBSS)** tracks specific health behaviors and conditions for students in grades 9-12. Things like sexual activity, mental health, nutrition, physical activity, tobacco use, and social experiences are measured. This survey is conducted at the national, state, and local levels. As of 2021, surveys have been conducted for over 5 million adolescents. These data help inform not only epidemiologists but also educators and lawmakers on how to support youth health. An example project developed from the YRBSS is the CDC's What Works in Schools, designed to help reduce risky sexual behaviors and teen pregnancies (Youth Risk Behavior Surveillance System, 2025).

Local reports, disease surveillance, vital statistics, and national surveys form the basis of data for epidemiological work.

Reference

National Vital Statistics System. (2023). National Vital Statistics System. National Center for Health Statistics www.cdc.gov

National Health Interview Survey. (2024). About the National Health Interview Survey. National Health Interview Survey www.cdc.gov

Seabert, D., McKenzie, J. F., & Pinger, R. R. (2022). An introduction to community & public health (10th ed). Jones & Bartlett Learning.

Youth Risk Behavior Surveillance System (2025). National Vital Statistics System. CDC. www.cdc.gov

This page titled 3.1: Where do Public Health Data Come From? is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

- 5.9: Where Can We Find Current Public Health Statistics? by Erin Calderone is licensed CC BY 4.0.

3.2: Public Health Surveillance

Disease surveillance is the process of gathering data on the prevalence and incidence of various diseases and conditions from different sources. This allows health departments to get a historical and current picture of the health status of the populations they serve. They can use surveillance to support decision-making on funding particular research projects, allocating resources to hospitals or other community programs, or responding quickly to outbreaks. This data on metrics other than infectious diseases can also be used to determine whether particular targets are being met, such as those set by the Healthy People initiatives.

Disease surveillance originally began with boots-on-the-ground investigation, and in some places, this is still the best method. However, new technologies and cutting-edge strategies help health departments keep tabs on the health of much larger populations. There are two primary ways that health departments can conduct surveillance: active and passive.

Active surveillance

Active surveillance is a more traditional method of door-knocking and interviewing residents of a community, or perhaps conducting telephone interviews. This is how surveillance had to be done in the early years. John Snow (covered in section 1.2 History of Public Health) famously visited houses in the Soho district of London. By interviewing residents in this area, he was able to record the number of cholera cases and deaths, and which houses were supplied by the two major water suppliers. This led him to discover that houses supplied by a single company (which drew its water from a particularly polluted area of the Thames River) had significantly higher rates of the disease. Even though no one knew about the bacteria that cause cholera or how it spreads, Snow collected enough evidence to convince officials to remove the handle of the Broad Street pump, thereby eliminating the contaminated water source.

Active surveillance can be more accurate than passive surveillance in detecting cases that develop over time. It can also help develop an understanding of community spread and potential sources of transmission. However, active surveillance, which requires door-knocking and interviews, is rarely conducted in modern times due to the significant financial and personnel costs.

Passive surveillance

Passive surveillance is used by health departments through the reporting of certain diseases that doctors and laboratories encounter in practice. For example, a doctor might see a patient complaining of symptoms that the doctor suspects are due to Hepatitis A. The doctor may ask for a stool sample and send it off to a laboratory to confirm the results. The laboratory tests the sample, confirms it is Hepatitis A, and reports the case to the local health department, which in turn reports it to the state health department and the CDC.

There are a few challenges with passive surveillance, one of which is that not everyone goes to a doctor or clinic for symptoms. Illnesses like influenza are often managed at home, so if a person feels like they have the flu, they won't go to the office; therefore, no official case is recorded or reported. Health departments have found other ways to monitor potential increases in influenza, such as gathering data from Google searches for flu-like symptoms, which tend to rise consistently before doctor visits and hospitalizations increase. A spike in symptom searches may indicate that the flu is spreading in the community among folks who probably won't visit the doctor, but who may pass it on to those who will experience more severe illness and end up in the hospital.

Table 1: provides examples of surveillance types from which public health data are derived, along with their applications, advantages, and disadvantages (Riegelman & Kirkwood, 2025, p. 65).

Type	Examples	Uses	Advantages/Disadvantages
Single case (or small series) **(Passive)**	Case report of one or a small number of cases (i.e., mad cow disease, first AIDS case)	Alert to new disease or resistant disease; alert to potential spread beyond the initial area	Useful for dramatic, unusual, and new conditions. Requires rapid ability to disseminate information.

Type	Examples	Uses	Advantages/Disadvantages
Statistics **(Passive)**	Vital statistics and notifiable diseases.	Required by law and imposed by penalties. Notifiable diseases may be helpful in identifying changes over time.	Information tends to be complete and reliable. There may be delays in reporting data.
Survey sampling **(Active)**	NHANES; YRFSS; NHISS	Drawing conclusions about the overall population and subgroups from representative samples. Registries attempt to include all those with a disease to be representative of the population.	Well-conducted surveys allow inferences to be drawn about larger populations. There may be delays in reporting data. A challenge may be found in including all potential patients in registries.
Self-reporting **(Passive)**	Adverse effect monitoring of drugs and vaccines as reported by those affected.	Helpful in identifying unrecognized or unusual events.	Useful when dramatic, unusual events closely follow the initial use of a drug or vaccine. Tend to be incomplete. Difficult to evaluate meaning because of the selective process of reporting.
Sentinel monitoring **(Passive)**	Influenza monitoring to identify the start of the outbreak and changes in the virus.	Helpful in providing early warnings of previously unrecognized (subtle) events.	Useful for "real-time" monitoring. Requires considerable knowledge of patterns of disease.
Syndromic surveillance **(Passive)**	Use of symptom patterns (i.e., headaches, cough/fever) and increase sales of OTC drugs to raise alertness.	Helpful in detecting unexplained and subtle changes, such as bioterrorism or a new epidemic that produces common symptoms.	Useful for early warning, even when no disease is diagnosed. It does not provide a diagnosis and may provide a false positive.
Social media **(Passive)**	Data on outbreaks using keywords from social media.	Detect and monitor the course of an epidemic.	Useful when obtaining immediate data from a large number of individuals. The data accuracy and precision for early and ongoing surveillance are unreliable and need to be established.

Exercise 3.2.1

One way to assess COVID-19 viral load was to analyze wastewater (sewage) samples and quantify the viral load. This was a non-invasive way to test for and track COVID-19, especially when home testing became available, and fewer people reported illness. What type of surveillance data was used, and was this type of surveillance active or passive? (Centers for Disease Control and Prevention, 2023)

Answer available at the end of this section.

Reference

Centers for Disease Control and Prevention. (2023). National wastewater surveillance system. Centers for Disease Control and Prevention. www.cdc.gov

Riegelman, R. & Kirkwood, B. (2025). Public Health 101 Improving Community Health (4th ed). Jones and Bartlett Learning LLC.

Answers

Exercise 3.2.1

Sentinel monitoring. Passive.

This page titled 3.2: Public Health Surveillance is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

- 6.6: Surveillance by Erin Calderone is licensed CC BY 4.0.

3.3: Notifiable Diseases

The **National Notifiable Disease Surveillance System (NNDSS)** is a division of the Centers for Disease Control and Prevention (CDC) and the hub for reporting and tracking data on specific diseases. The NNDSS compiles weekly and annual data to keep communities and the nation healthy, and it is a tool that public health officials use to understand where diseases occur, how they can be prevented, and which groups are most heavily affected. The chain of notification starts with the patient visiting a medical doctor; the doctor identifies the notifiable disease; the doctor (or the laboratory) notifies the local (or state) public health department; the public health department notifies the Centers for Disease Control and Prevention. In turn, the Centers for Disease Control provide the community with information, guidance, and support. The purpose of the notifiable disease surveillance is (Centers for Disease Control and Prevention, 2024):

- Detect disease when and where it happens.
- Stop the diseases before they spread.
- Study diseases to strengthen the science.
- Improve prevention and control of disease.
- Keep the population healthy.

> There are about 120 diseases under surveillance, including infectious diseases, bioterrorism agents, sexually transmitted diseases, and noninfectious conditions. The list of notifiable diseases can be found on the Centers for Disease Control and Prevention website (2025).

To illustrate the importance of the NNDSS and the crucial role the CDC plays in helping keep the nation's health, let's analyze the first Ebola outbreak in the United States. However, first, let's understand Ebola, the disease. Ebola is caused by a contagious, virulent virus endemic to Sub-Saharan Africa. The virus is spread through "direct" contact with an infected person's bodily fluids (not through casual contact or the air). The symptoms start as early as 2 days and as late as 21 days after contact with the virus. The initial symptoms are fever, aches, pain, and fatigue, which then progress to include diarrhea, vomiting, and unexplained bleeding (Centers for Disease Control and Prevention, 2024). The infected person usually dies due to the body's immune system overactivity (called cytokine storm - seen most recently in COVID-19 infections) as it attempts to clear out the virus, and organ system damage (called hemorrhagic fever -internal bleeding) caused by the overabundance and nature of the virus.

The first Ebola case in the United States started on September 15, 2014, when Thomas Duncan drove a pregnant woman with signs of having a miscarriage, but later was discovered to be Ebola positive and taken to a treatment hospital in Monrovia, Liberia. On September 19, Duncan boarded a flight that arrived in Dallas on September 20, 2014. Duncan's symptoms started on September 24th, and he went to one of Dallas' emergency room hospitals on September 25th, where he was triaged. At the time, he complained of abdominal pain, dizziness, nausea, and headache (the recorded temperature was 100.1F). In 2014, travel history was not part of triage protocol, so this information was not inquired. In the treatment area, lab results returned with "no acute disease." He was diagnosed with sinusitis and prescribed an antibiotic (note, antibiotics do nothing for viral infections).

On September 28, Duncan's condition worsened, and he was transported to the emergency room via ambulance. He was now experiencing diarrhea, abdominal pain, and fever. The attending doctor noticed he had recently arrived from Liberia and tested him for Ebola. At the time, medical personnel were following strict CDC protocols by wearing masks, gowns, and gloves. Duncan was now experiencing projectile vomiting, explosive diarrhea, and severe fatigue. The hospital evacuated all other patients from the Intensive Care Unit and transferred and isolated him to the ICU. The next day, September 30th, the test result arrived positive, and he was diagnosed with Ebola.

Duncan was treated, and twice he seemed to be getting better, only to get worse. He died of Ebola on October 8 and became the first Ebola-related death in the United States. Officials conducted contact tracing and found that 100 people may have had contact with those who had direct contact with Duncan after he began showing symptoms. They were being monitored for symptoms and only liberated after 21 days of isolation, with no symptoms observed. The only people who contracted the virus were two nurses in his care team. Both nurses tested positive for the virus, isolated, and treated. They both lived with the infection (Wikipedia, 2025).

Ebola is a notifiable disease. The Dallas hospital, Texas Health Presbyterian Hospital, sent Duncan's test sample to the Texas Department of State Health Services in Austin, which then notified the CDC on September 28, 2014 (Ura, 2014). At this point,

the CDC provided guidance and help with the outbreak. The aid included rapid testing (Ebola Reverse Transcription Polymerase Chain Reaction) training for local staff, expertise to evaluate and train (if needed) the readiness to care for patients with Ebola, and expert teams (CDC Ebola Response Teams) to deploy where needed within the United States. Also, the CDC was involved in improving protection against the importation of Ebola in the United States by working closely with U.S. Customs and Border Protection, the Department of Homeland Security, and the state and local public health departments to put in place a system to screen and follow up all travelers returning from Ebola-affected countries (Bell et al., 2016). In conclusion, the Ebola outbreak in the United States was contained within a reasonable timeframe due to the National Notifiable Disease Surveillance System.

Reference

Bell, B. P., Damon, I. K., Jernigan, D. B., Kenyon, T.A., Nichol, S.T., O'Connor, J.O., & Tappero, J.W,. (2016). Overview, control strategies, and lessons learned in the CDC response to the 2014-2016 Ebola epidemic. Centers for Disease Control and Prevention. www.cdc.gov

Centers for Disease Control and Prevention. 2024. Ebola disease Basics. Centers for Disease Control and Prevention.Centers for Disease Control and Prevention www.cdc.gov/ebola/about/index

Centers for Disease Control and Prevention. 2025. 2025 National notifiable conditions. Centers for Disease Control and Prevention. ndc.services.cdc.gov

Centers for Disease Control and Prevention. 2024. What is case surveillance? Centers for Disease Control and Prevention. www.cdc.gov

Ura, A. 2014. What you need to know about the Texas Ebola case. The Texas Tribute. www.texastribune.org

Wikipedia. 2025. Ebola virus in the United States. Wikipedia: en.wikipedia.org

This page titled 3.3: Notifiable Diseases is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

3.4: Quality of Health Information

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 bombarded with confusing and conflicting information can cause people to lose trust in public health agencies, leading them to 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 faces a new epidemic: the "infodemic" of misinformation.

It is important to define the types of incorrect information shared, whether or not there is a clear intention to mislead the public. The term "misinformation" is an umbrella term that encompasses errors in interpreting data, research, or messaging, as well as information once considered accurate but later found to be false. **Misinformation** may be believed and shared naively. **Disinformation,** on the other hand, is misinformation shared intentionally for ulterior motives, such as social, political, or financial gain. However, it is difficult and sometimes dangerous to assume the intentions of whoever is sharing. Unless the sharer's intentions are obvious and vile, 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 (although 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 affected population health outcomes. Even though measles was declared eliminated in the U.S. in 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 virus that causes COVID-19), 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, Ophir, & Ye, 2023). With the rapid pace of internet and social media communication, misinformation has the potential 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 of how misinformation and the politicization of health beliefs can significantly affect population behavior. The novelty of the virus and shifting guidance from government health agencies did not bolster public confidence in official messaging, creating an environment ripe for conspiracy theories to spread. 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. Taken together, misinformation and a lack of trust in public health agencies directly affected individual behaviors. Violent confrontations arose over masking requirements (Hutchinson, 2020), and later workplace vaccine requirements became equally controversial (Bardosh et al., 2022).

Reference

Bardosh, K., de Figueiredo, A., Gur-Arie, R., Jamrozik, E., Doidge, J., Lemmens, T., Keshavjee, S., Graham, J. E., & Baral, S. (2022). The unintended consequences of COVID-19 vaccine policy: Why mandates, passports and restrictions may cause more harm than good. BMJ Global Health, 7(5), e008684. doi.org/10.1136/bmjgh-2022-008684

DeStefano, F., & Shimabukuro, T. T. (2019). The MMR vaccine and autism. Annual Review of Virology, 6(1), 585–600. hdoi.org/10.1146/annurev-viro...-092818-015515

Hutchinson, B. (2020, May 7). 'Incomprehensible': Confrontations over masks erupt amid COVID-19 crisis. ABC News. abcnews.go.com

Seymour, B., Getman, R., Saraf, A., Zhang, L. H., & Kalenderian, E. (2015). When advocacy obscures accuracy online: Digital pandemics of public health misinformation through an antifluoride case study. American Journal of Public Health, 105(3), 517–523. doi.org/10.2105/ajph.2014.302437

Swire-Thompson, B., & Lazer, D. (2020). Public health and online misinformation: Challenges and recommendations. Annual Review of Public Health, 41(1), 433–451. doi.org/10.1146/annurev-publ...-040119-094127

Walter, D., Ophir, Y., & Ye, H. (2023). Conspiracies, misinformation and resistance to public health measures during COVID-19 in white nationalist online communication. Vaccine, 41(17), 2868–2877. doi.org/10.1016/j.vaccine.2023.03.050

This page titled 3.4: Quality of Health Information is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

- 5.2: Public Health and the Fight Against Misinformation by Erin Calderone is licensed CC BY 4.0.

3.4.1: Internet, Social Media, and the Age of Algorithm

As we might already assume, most people get health information online in the 21st Century. When faced with a new symptom or health decision, the first action is often a simple internet search. Which websites appear at the top of the results list may be determined by advertising dollars or by search engine algorithms that tailor results to a person's past search history. Further direct-to-consumer advertising by medical and pharmaceutical companies can result from a search, a website visit, or a 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 usage data. User-generated content can be quickly shared with a broad audience, often without identifying the original source or verifying 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 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 undertake.

As humans, we already struggle with a variety of cognitive biases that cloud our decision-making. Availability bias (more of "it" makes 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 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, access to information is potentially limitless, but its quality remains malleable to both commercial interests and machine learning algorithms.

Reference

Bardosh, K., De Figueiredo, A., Gur-Arie, R., Jamrozik, E., Doidge, J., Lemmens, T., Keshavjee, S., Graham, J. E., & Baral, S. (2022). The unintended consequences of COVID-19 vaccine policy: Why mandates, passports and restrictions may cause more harm than good. BMJ Global Health, 7(5), e008684. doi.org/10.1136/bmjgh-2022-008684

Stark, M., & Fins, J. J. (2013). Engineering Medical Decisions: Computer Algorithms and the Manipulation of Choice. Cambridge Quarterly of Healthcare Ethics, 22(4), 373–381. doi.org/10.1017/s0963180113000224

This page titled 3.4.1: Internet, Social Media, and the Age of Algorithm is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

- 5.2.1: Internet, Social Media, and the Age of Algorithms by Erin Calderone is licensed CC BY 4.0.

3.4.2: Credible Sources

So how do reputable sources get correct information out to the public? How can government agencies and scientific communities regain and maintain the public trust?

Many government organizations described in earlier chapters maintain public-facing websites that describe their work, policies, news reports, and guidance developed from that work. Some agencies also maintain social media pages and provide traditional media with press releases on emerging health concerns. Several also produce toolkits to aid health workers and educators in communicating with the public, such as the CDC, WHO, and FDA. The CDC also posts guidelines, toolkits, and professional development modules to assist health professionals in creating clear and equity-focused communication materials.

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 its communication practices, including (CDC, 2023):

- To provide timely and accurate data to the American public, CDC is working to share scientific findings and data more quickly by releasing information to the public and partners about CDC's current level of understanding of the science and data.
- To make science and data easier for broad audiences to interpret, CDC is translating science into practical, easy-to-understand policy by clarifying and presenting scientific language so that anyone can understand it and standardizing guideline development across the agency.
- To communicate with one voice during and across public health emergencies, CDC is prioritizing public health communications by improving how the American public interacts with CDC, including a review of the entire CDC.gov website to assess content and functionality.

As information becomes increasingly 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, in online arguments over "which diet is best", and, of course, in 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 many health "influencers" - and even researchers themselves - can end up spreading misinformation, even with good intentions.

Let's be clear that "the science" - or what we should more accurately call scientific consensus - does 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 its recognition of research limitations and its open-minded approach to learning and testing new discoveries. "Good science" is constantly testing and trying to prove ourselves wrong in as many ways as possible before we can consider our conclusions "correct". Two ways to ensure that a particular research study is conducted well are to ensure that the research methods are **valid** and **reliable.**

Validity

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 with which an arrow hits a target. If the test consistently hits the "bullseye" of the target (the thing we are trying to measure), then it is accurate or valid. Most testing methods must be validated or compared against a "gold standard," which is the best measurement available 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 highly on the 1.5-mile run would presumably also have scored highly on a VO2max test, and there needs to be ample evidence that the 1.5-mile run score reflects the subject's ability to perform cardio exercise.

Reliability

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**.

Intertester

Inter-tester means between testers, so, for example, if we had two coaches at the finish line with stopwatches 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 will get different scores from different testers; therefore, the test is unreliable as 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.

Intratester

If the same researcher gets significantly different results each time they repeat the test on the same subject, then the test itself is unreliable and shouldn't be used. To use our previous analogy of arrows and a target's bullseye, a reliable test is one that clusters all the arrows closely around the same area.

Researcher's Interpretation, Consensus, and Gatekeeping

Another requirement for good research is the researcher's interpretation of the research. Researchers are human, just like everyone else, and the conclusions they draw from their own studies may be flawed. The goal of the **peer-review** process is to identify errors and weaknesses in the study methods or in the interpretation of the results, and correct them 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 substantial body of research supports a particular conclusion, scientists often convene to reach a consensus. This consensus is simply an agreement among the folks who know the most about a particular topic, who are confident in their conclusions. Sometimes a consensus isn't reached because there are too many conflicting research studies, or the evidence is equivocal, meaning it is open to several interpretations.

A historical problem with high-quality research is that it is often behind a paywall. The most reputable scientific journals often require readers to pay expensive annual professional membership fees. Sometimes these fees can be covered during higher education enrollment through the college or university's access to scholarly journals, but the institution is footing the bill. Once a student graduates, they no longer have access to these library databases and must pay professional fees to access 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 professional communities or academic institutions that can afford membership, and to 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, open-access publishers still face challenges. 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).

Reference

Resnick, B., & Belluz, J. (2019). The open access wars: How to free science from academic paywalls. Vox. www.vox.com

Murthy, V. H. (2021). Confronting Health Misinformation: The U.S. Surgeon General's Advisory on Building a Healthy Information Environment. U.S. Department of Health and Human Services, Office of the U.S. Surgeon General. www.hhs.gov

This page titled 3.4.2: Credible Sources is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

- 5.3: Public Health Messaging by Erin Calderone is licensed CC BY 4.0.
- 5.4: Is Science Even Trustworthy? by Erin Calderone is licensed CC BY 4.0.

3.5: Measuring the Health of a Population

In the early 20th century, infant mortality was high. Even in a developed country such as the United States, "it was not unusual for over 100 of every 1,000 newborns to die in the first year of life." (Riegelman & Kirkwood, 2025 p66). Therefore, the standard indicators for assessing a population's health status were the infant mortality rate and life expectancy.

Infant Mortality Rate and Under-5 Mortality Rate

The **infant mortality rate** is the number of deaths of infants under one year old per 1,000 live births. Today, many countries have seen infant mortality rates below 10 per 1,000 live births (Riegelman & Kirkwood, 2025, p. 66). This is mainly due to the improvements in medicine, nutrition, and the prevention of old and new infectious diseases. Because of these health initiatives, infants are passing the year mark only to succumb later. Therefore, the new measure is **the under-5 mortality rate (U5MR)**. The U5MR is the number of deaths of infants and children under five years old per 1000 live births (United Nations Children's Fund [UNICEF], 2025). Figure 1 below illustrates the stark global disparities in child mortality, measured as deaths per 1,000 live births, by using the world map. The data reveal a high concentration of infant and child deaths in sub-Saharan Africa and parts of Southern Asia, represented by deep reds and browns, indicating rates exceeding 100 per 1,000 births. Conversely, industrialized nations in North America, Europe, and Oceania reflect the lowest mortality tiers (0–5). This geographic distribution highlights the correlation between socioeconomic development, healthcare infrastructure, and survival outcomes for children under five.

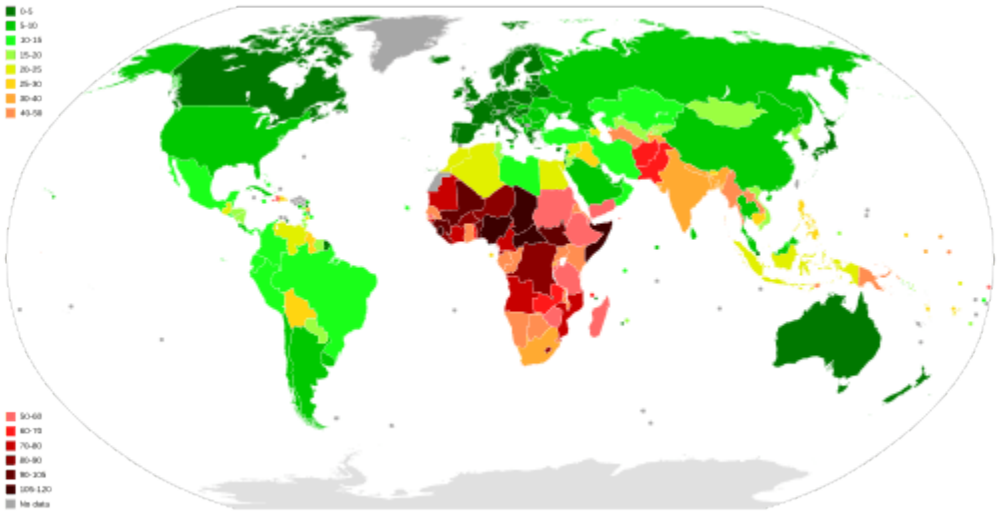


Figure 3.5.1: MAP of World Under-5 Mortality Rate for 2019. The map depicts the majority of African countries, Pakistan, and Afghanistan as having a U5MR of 50 and over. Detailed description in the text (Creative Commons-Attribution-ShareAlike 4.0 license; Wikipedia)

Life expectancy

Life expectancy is simply the average number of years a person can expect to live at a given age. This is a great indicator of how well a country is doing in terms of health that year. Within the last century, we have seen an increase in life expectancy. Interestingly, the declines have been seen in Sub-Saharan Africa due to HIV/AIDS, and overall in other countries due to the COVID-19 pandemic. In the United States, life expectancy declined by more than a year due to the pandemic. It is expected that a continued decline in life expectancy in the United States will happen due to obesity and the opioid epidemic (Riegelman & Kirkwood, 2025, p. 67).

It is interesting to note that the most common causes of death have changed over the last century. In the early 1900s, the leading causes of death were infectious diseases like pneumonia, influenza, tuberculosis, and diarrheal diseases, with heart disease (a chronic disease) coming in at the 4th leading cause of death. Infectious diseases are spread between people and can cause death at any age, although the very young (under 5 years old) and older adults tend to be the most at risk. By 1940, this trend had shifted, placing heart disease and cancer at the top and infectious diseases further down, with pneumonia and influenza at #5

and tuberculosis at #7. In 2017, heart diseases, cancers, unintentional injuries (accidents), and chronic lower respiratory diseases were the top 4 leading causes of death. Chronic, noncommunicable diseases like heart disease, diabetes, cancers, and COPD are not spread between people (you can't catch this type of disease like a cold), and they tend to progress over a long period of time - even several decades - which also means that increasing age is a risk factor. Another key feature of chronic diseases is that there are often lifestyle behaviors like nutrition, physical activity, and smoking, and environmental factors like exposure to toxins that contribute to their development. Although both chronic diseases and infectious diseases have been leading causes of death over the last century, chronic diseases have certainly begun to outpace infectious diseases up until the COVID-19 pandemic (Penn Wharton University of Pennsylvania, 2016).

Average life expectancy takes into account all deaths - those at young ages, middle ages, and advanced ages. Chronic diseases will be more likely to cause death at advanced ages, since these diseases take a long time to develop and cause harm. In the early 1900s, the average life expectancy was around 47 years, but that average was likely skewed due to the high infant and child mortality rates experienced from infectious diseases like tuberculosis and pneumonia. Advances in nutrition, urban sanitation, vaccines, and antibiotic development from the 30s to the 60s significantly increased life expectancy for children and infants, thereby raising average life expectancy (Penn Wharton University of Pennsylvania, 2016).

In 2021, the average life expectancy for all U.S. citizens was 76.4 years, a decline from 2020 (77 years) (Arias et al., 2023) and 2019 (78.8 years) (Arias & Xu, 2022). As stated earlier, the primary event driving this shift in average life expectancy was the COVID-19 pandemic, which accounted for 385,676 deaths in 2020 and 463,276 in 2021 (Centers for Disease Control and Prevention, 2023). This made COVID-19 the third leading cause of death in both years (National Center for Health Statistics, 2023). In 2023, COVID-19 deaths dropped to the #10 leading cause of death. For many years, heart disease and cancer have been the #1 and #2 leading causes.

Health-adjusted Life Expectancy

The World Health Organization (WHO) has expanded the concept of life expectancy to include health-adjusted life expectancy (HALE). HALE tells us the average duration of life a person can expect to enjoy in "full health" by subtracting years lived with the burden of disease or injury from their overall life expectancy. Significant effort goes into reducing the occurrence, duration, and severity of major illnesses that, while not deadly, still diminish people's well-being. To get a complete picture of population health, we need a measure that includes both deaths and non-fatal health issues. Health-adjusted life expectancy (HALE) at birth estimates how long people can expect to live under different health conditions, accounting for the severity of those conditions. This makes HALE a useful tool for tracking changes in population health over time or comparing health across different countries. In practical terms, the WHO uses survey data to obtain a country's overall quality of health score, which for most countries ranges from 85% (poor) to 90% (very good), and then this score is multiplied by the life expectancy at birth to calculate the HALE (World Health Organization, 2025).

Disability-adjusted Life Years

The WHO also believes that to truly understand the impact of diseases and risk factors on the population, one needs to examine disability-adjusted life years (DALYs). A DALY represents one lost year of full health, making it possible to compare the impact of diseases that lead to early death with minimal disability (such as drowning or measles) to those that cause significant disability without necessarily causing death (like cataract-induced blindness). This measurement is accomplished by comparing one country's performance with that of the country with the longest life expectancy (Japan) (World Health Organization, 2025).

Reference

Arias, E., & Xu, J. (2022). United States life tables, 2020. National Center for Health Statistics. dx.doi.org/10.15620/cdc:118055

Arias, E., Xu, J., & Kochanek, K. (2023). United States Life Tables, 2021. National Center for Health Statistics (U.S.). dx.doi.org/10.15620/cdc:132418

Centers for Disease Control and Prevention. (2023). COVID-19 Mortality Overview. CDC www.cdc.gov

National Center for Health Statistics. (2023). Leading Causes of Death. www.cdc.gov

Penn Wharton University of Pennsylvania (2016). Mortality in the United States: Past, present, and future. Penn Wharton University of Pennsylvania. www.budgetmodel.wharton.upenn.edu

Riegelman, R., & Kirkwood, B. (2025). Public Health 101 Improving Community Health (4th ed). Jones & Bartlett Learning, LLC.

United Nations Children's Fund [UNICEF]. (2025). Levels and trends in child mortality. UNICEF www.data.unicef.org/resources

World Health Organization (2025). Healthy life expectancy (HALE) at birth. WHO www.who.int

World Health Organization (2025). Disability-adjusted life years (DALYs). WHO www.who.int/data

This page titled 3.5: Measuring the Health of a Population is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

- 6.4: Life Expectancy and Leading Causes of Death by Erin Calderone is licensed CC BY 4.0.

4: PUBLIC HEALTH AND BEHAVIORAL SCIENCE

In many ways, social and behavioral sciences affect how a community or population responds to public health efforts. It is important to understand the impact these social and behavioral issues have on a community and to have an overview of the most common health concerns in the lifespan. This is what will be covered in this chapter.

4.1: The Relation between Public Health and Social and Behavioral Sciences

4.2: The Relation between Social Systems and Health

4.3: Behavioral Change Models and Theories

4.3.1: Theory of Planned Behavior

4.3.2: Health Belief Model

4.3.3: Social Cognitive Theory

4.3.4: Self-Determination Theory

4.3.5: Transtheoretical Model AKA-Stages of Change

4.3.6: The Social-Ecological Model

4.3.7: Community Intervention Models

4.3.8: Mobilizing Action through Planning and Partnerships (MAPP)

4.3.9: PRECEDE-PROCEED Model

4.3.10: Diffusion of Innovation

4.4: Influence of Change Health Behavior

4.5: Prevalent Health Concerns through the Life Phases

4.5.1: Maternal, Infant and Child

4.5.2: Adolescent and Adulthood

4.5.2.1: Unintentional Injuries

4.5.2.2: Violence

4.5.2.3: Drug Abuse and Addiction

4.5.2.4: Tobacco Use

4.5.2.5: Nutrition

4.5.2.6: Physical Activity and Fitness

4.5.2.7: Obesity

4.5.2.8: Mental Health

This page titled 4: Public Health and Behavioral Science is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

4.1: The Relation between Public Health and Social and Behavioral Sciences

Public health can be viewed as an application of many social sciences. Public health and the social and behavioral sciences were formed to address social and economic inequalities. With time, this effort was seen as part of **social justice**. The social justice mission is to ensure fair treatment and benefits for all, regardless of race, religious beliefs, gender, sexual orientation, political views, country of birth, class, or any other identity factors (Harvard University, 2025).

One of the greatest collaborations between the social and behavioral sciences is the field of health theory. Evidence has shown that public health interventions grounded in social and behavioral science theories are more effective (Glanz & Bishop, 2010). These theories will be covered in later pages; however, at this moment, let's examine how certain disciplines have contributed to public health (Riegelman & Kirkwood, 2025, p. 87).

Table 1 describes the various disciplines and their contribution to public health.

Social science discipline	Examples of contributions to public health
Psychology	Theories of the origins of behavior and risk-taking tendencies, and methods for altering individual and social behaviors.
Sociology	Theories of social development, organizational behavior, and systems thinking; social impacts on individual and group behaviors.
Anthropology	Social and cultural influences on individual and population decision-making for health and a global perspective.
Political science/ public policy	Approaches to government and policy-making related to public health; structures for policy analysis and the impact of government on public health decision-making.
Economics	Understanding the micro- and macroeconomics impact on public health and healthcare systems.
Communications	Theory and practice of mass and personalized communication and the role of media in communicating health information and health risks.
Demography	Understanding demographic changes in populations globally due to aging, migration, and differences in birth rates, plus their impact on health and society.
Geography	Understanding the impacts of geography on diseases and determinations of disease, as well as methods for displaying and tracking the location of disease occurrence.

Reference

Glanz K., & Bishop, D. B. (2010). The role of behavioral science theory in development and implementation of public health interventions. Annual Review of Public Health Vol.31: 399-418. DOI: 10.1146/annurev.publhealth.012809.103604

Harvard University. 2025. What is Social Justice Education and Why Does It Matter? Harvard University www.professional.dce.harvard.edu

Riegelman, R. & Kirkwood, B. (2025). Public Health 101 Improving Community Health (4th ed). Jones and Bartlett Learning, LLC.

This page titled 4.1: The Relation between Public Health and Social and Behavioral Sciences is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

4.2: The Relation between Social Systems and Health

Social systems profoundly influence health by shaping the acceptable norms within a community or society. These norms, often unspoken, dictate which behaviors are considered normal, appropriate, or even desirable, and, in turn, can significantly impact individual and collective health outcomes. For example, in the past, around the mid-20th century, smoking was widely accepted and even glamorized. Social systems, such as advertising, social gatherings, and celebrities, shaped this norm. Currently, in the 21st century, smoking is largely de-normalized. This shift is a direct result of changes in social systems and the establishment of new norms, including public health campaigns, policy changes, social stigma, and medical consensus. As a result, the de-normalization of smoking has led to a significant decline in smoking rates, resulting in a decrease in smoking-related diseases and an improvement in overall public health.

Currently, three components of the social systems (socioeconomic status, culture, and religion) have a significant impact on health behavior (Riegelman & Kirkwood, 2025 pp 87-91):

- **Socioeconomic Status:** In the United States, socioeconomic status is associated with family income, educational attainment, and occupational status. It is shown that higher income provides access to healthier living conditions such as improved sanitation, less crowding, greater access to healthcare, and safer cooking and eating. Higher educational level is associated with behaviors that protect against disease and reduce exposure to risk factors. Disparities in socioeconomic status are associated with poorer population health. A measure of inequality, based on income distribution, is the Gini Index. The index ranges from 0 to 1 (or it can be multiplied by 100 to express it as a percentage), where 0 indicates less inequality and values closer to 1 indicate greater inequality.
- **Culture:** Culture shapes daily choices, including food preparation and how one responds to symptoms (of a disease) and accepts or rejects an intervention. For example, some cultures decide to self-treat instead of seeking medication assessment. This can be seen with the overzealous use of Vicks VapoRub as the cure-all in the Latino culture.
- **Religion:** Some religious groups either encourage or condemn certain health practices, thereby influencing their followers' health. Some of these practices include the use of condoms, alcohol, tobacco, allowance for male circumcision, blood transfusion, and abortion. One interesting, well-studied group that has been shown to live an average of 7-10 years longer than the general United States population is the Seventh-day Adventists in Loma Linda, California. They have been renowned for their health and longevity and have been designated as one of the World's Blue Zones. Their lifestyle factors include: plant-based diet, physical activity, no smoking or alcohol, Sabbath rest, strong social circles, and purposeful living (Buettner & Skemp, 2016).

Reference

Buettner, D. & Skemp, S. (2016). Blue zones. American journal of lifestyle medicine, lessons From the World's Longest Lived. Jul 7;10(5):318-321. doi: 10.1177/1559827616637066

Riegelman, R. 7 Kirkwood, B. (2025). Public health 101 Improving community health (4th ed.). Jones & Bartlett Learning, LLC.

This page titled 4.2: The Relation between Social Systems and Health is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

4.3: Behavioral Change Models and Theories

Why do people engage in some health behaviors and not others? One of the earliest models describing behavior is classical conditioning, as demonstrated by Ivan Pavlov's experiments with dogs. In these experiments, Pavlov noticed that the dogs would salivate when hearing noises associated with feeding time. He then began ringing a bell before feeding them, and eventually they associated the sound with food and salivated at it. Classical conditioning has been used as a model for treating cravings, phobias, and even bedwetting (Rehman et al., 2023). Subsequent behavioral researchers like B.F. Skinner proposed a stimulus-response model that is based on the behavior's subsequent result - either reinforcement or punishment (McKenzie et al., 2017). These reinforcements or punishments may be artificially imposed by us or by authority figures such as parents, employers, or the government, or they may be natural consequences of behavior. For example, if a person discovers that they are in a better mood after exercising, they are more likely to continue exercising because they expect the happy feelings to follow. Alternatively, if they associate exercise with debilitating muscle soreness, they are likely to avoid it!

Is human behavior really this simple, though? Perhaps, on the surface, for an individual trying to change their own behavior or prompt a child's (or perhaps a dog's) behavior, these models can be useful. However, they tend to ignore the rest of that individual's life and lived experience, including the complexities of intrapersonal factors (such as beliefs and attitudes), interpersonal factors (such as cultural and social norms, and support systems), and environmental factors (such as economics, their physical environment, and politics). Other models of behavior expand into these different areas.

In the following pages, we will examine the variety of behavioral change models and theories relevant to public health.

Reference

McKenzie, J. F., Neiger, B. L., & Thackeray, R. (2017). Planning, implementing, and evaluating health promotion programs: A primer (7th ed.). Pearson Education.

Rehman, I., Mahabadi, N., Sanvictores, T., & Rehman, C. I. (2023). Classical conditioning. StatPearls.

This page titled 4.3: Behavioral Change Models and Theories is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

- 13.1: Introduction by Erin Calderone is licensed CC BY 4.0.
- 13.2: Behavioral Change Theories and Models by Erin Calderone is licensed CC BY 4.0.

4.3.1: Theory of Planned Behavior

The Theory of Planned Behavior (TPB) was developed by Icek Ajzen from the Theory of Reasoned Action (first proposed by Martin Fishbein and Ajzen), which describes how an individual might intend to change behavior. This intention is essentially the decision made by the person to "do the thing" right before they do it - intention immediately precedes the behavior. The TPB model involves 3 factors that influence intention: behavioral beliefs, subjective norms, and perceived behavioral control. Behavioral beliefs are the ideas we hold about a behavior, such as whether it is effective in achieving the desired outcome (McKenzie et al., 2017).

Behavioral Beliefs

As a hypothetical example, if someone believes that exercise is an effective way to improve their health, they are more likely to start a fitness program. Conversely, if they believe that exercise is ineffective, too hard, takes too much time, not worth the effort, etc., they probably won't. These beliefs may be based on scientific evidence, personal experience, or something else entirely, but they are highly influential in a person's readiness to change behavior.

Subjective Norms

The second component of the TPB is the subjective norms of that person's social circle. These social norms may influence a person's beliefs about the behavior, and vice versa (McKenzie et al., 2017). These social norms can also be "positive peer pressure" to engage in healthy behaviors. Using our previous example, if most of a person's circle of family and friends are regular exercisers or involved in sports, they will consider physical activity the "norm". Evidence suggests that children and teens are far more physically active when parents are supportive. This support might include role-modeling an active lifestyle, taking them to sports practices and games, verbally encouraging them, or even just engaging in active play (Su et al., 2022).

Perceived Behavioral Control

Lastly, in order for a person to change a behavior, they need to have "perceived behavioral control". That is, they need to believe they can change that behavior; they have what it takes. This may include actual behavioral control - meaning the skills, resources, and environment needed to change the behavior - but even if the actual control is there, if the person doesn't believe they have control over their behavior, they are not likely to change it (McKenzie et al., 2017). This concept is very similar to self-efficacy, as presented in other models of behavioral change (see the following sections). If our hypothetical person believes that exercise improves health and those around them exercise as well, but they don't believe they'll ever be able to stick with a fitness program, this alone may prevent them from exercising.

In summary, the TPB has been successfully utilized in several experimental and quasi-experimental studies aiming to improve nutrition, increase physical activity, change traffic safety behaviors (like seat belt wearing in cars or helmet wearing while riding a bicycle), increase safe-sex behaviors, reduce alcohol and drug use, and even improve behaviors at work (like ergonomics and stress reduction). Practitioners can use techniques such as providing information, persuasion, skill development, planning, social encouragement, goal setting, motivation, self-monitoring, and modeling to help people change their behavioral, normative, and control beliefs, thereby increasing their intention to change. Some strategies work better to help a person increase their motivation, which leads to intention. Other strategies might work better after the person has expressed an intention to change; they have the motivation already and now just need the tools (actual control) to reach their goals (Steinmetz et al., 2016).

Reference

McKenzie, J. F., Neiger, B. L., & Thackeray, R. (2017). Planning, implementing, and evaluating health promotion programs: A primer (7th ed.). Pearson Education.

Steinmetz, H., Knappstein, M., Ajzen, I., Schmidt, P., & Kabst, R. (2016). How Effective are Behavior Change Interventions Based on the Theory of Planned Behavior? Zeitschrift Für Psychologie, 224(3), 216–233. doi.org/10.1027/2151-2604/a000255

This page titled 4.3.1: Theory of Planned Behavior is shared under a CC BY 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 13.3: Theory of Planned Behavior by Erin Calderone is licensed CC BY 4.0.

4.3.2: Health Belief Model

The Health Belief Model (HBM) was actually proposed by researchers working for the U.S. Public Health Service in the 1950s, who were attempting to explain why some people might not opt for health screenings (such as a tuberculosis test) or vaccinations (such as those for polio), especially if these were offered at little to no cost (Rosenstock, 1974). This model asserts that in order for a person to take action, they must have certain beliefs, including:

- That the consequences of not taking action are severe,
- That the person themselves is susceptible,
- And that the perceived benefits outweigh the perceived costs of taking action.

There also needs to be cues in the environment that prompt the person to take action. Subsequent applications of the HBM to more complex behaviors also highlighted the importance of including self-efficacy in this process. Self-efficacy is the belief that a person has about their own ability to take a specific action. Thus, a lack of self-efficacy could be considered a substantial perceived barrier in this model (McKenzie et al., 2017).

Both, the Theory of Planned Behavior (TPB) and the Health Belief Model (HBM) are intrapersonal models, meaning they focus primarily on what the individual thinks, believes, and decides about their own behavior. The TPB certainly recognizes the influence of social norms, and the HBM perhaps implicitly includes some environmental aspects into the perceived barriers and benefits, yet these models may not fully explain how a person develops beliefs or self-efficacy. The next model attempts to do just that.

Reference

McKenzie, J. F., Neiger, B. L., & Thackeray, R. (2017). Planning, implementing, and evaluating health promotion programs: A primer (7th ed.). Pearson Education.

Rosenstock, I. M. (1974). Historical origins of the health belief model. Health Education Monographs, 2(4), 328–335. doi.org/10.2307/45240621

This page titled 4.3.2: Health Belief Model is shared under a CC BY 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 13.4: Health Belief Model by Erin Calderone is licensed CC BY 4.0.

4.3.3: Social Cognitive Theory

Social cognitive theory (SCT) was developed by Albert Bandura in the 1980s and built upon his earlier theory of social learning. Learning is an important component of SCT, characterized by reinforcement of a particular behavior. Bandura presented the SCT as a loose framework in which each component exerted bidirectional influence: each influenced the others and was influenced by them. Personal factors include a person's experiences, thoughts, and feelings, which are strongly influenced by their environment and also shape the behaviors they engage in. Their environment includes the people in their social circles who may both model behaviors and reinforce them, but the individual also influences that circle. Finally, the behaviors themselves and the experiences of engaging in them will affect the environment and the person's thoughts and feelings (LaMorte, 2022).

This theory includes several concepts that tie these factors together: behavioral capability, self-efficacy, expectancies, and reinforcements. The first is behavioral capability, which refers to the knowledge and skills individuals must possess to adopt a new behavior. Self-efficacy is the personal belief that one has the knowledge and skills to engage in a behavior effectively. For example, if someone wants to adopt a healthy dietary pattern, they must first know what a healthy diet is and, secondly, how to prepare these foods (behavioral capability). They must also believe that this dietary change is possible for them (self-efficacy). One factor that contributes to developing both behavioral capability and self-efficacy is observational learning, which simply means people learn by watching others. If a child observes their parents preparing fruit for a snack, they are more likely to copy them. And observational learning works for adults too - if a person sees their neighbors taking walks every day, they might be more likely to do so themselves. Expectancies are the value a person places on the anticipated outcome of a behavior. For example, if a person values healthy eating over taste, they are more likely to eat health-promoting foods, whether they taste good or not. Finally, reinforcements occur as a result of the behavior and can be natural consequences or imposed by the person or their social group. A reinforcement for eating a healthy diet might be feeling good, rewarding themselves with a treat, or receiving praise from a friend or family member. Reinforcements are a key component of the SCT model (LaMorte, 2022; McKenzie et al., 2017).

Reference

LaMorte, W. W., . (2022). The social cognitive theory. Boston University School of Public Health. www.sphweb.bumc.bu.edu

McKenzie, J. F., Neiger, B. L., & Thackeray, R. (2017). Planning, implementing, and evaluating health promotion programs: A primer (7th ed.). Pearson Education.

This page titled 4.3.3: Social Cognitive Theory is shared under a CC BY 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 13.5: Social Cognitive Theory by Erin Calderone is licensed CC BY 4.0.

4.3.4: Self-Determination Theory

Another theory that emerged in the 1970s and 80s was the Self-Determination Theory (SDT), developed by psychologists Edward Deci and Richard Ryan. This model focuses on what motivates a person to perform a task or work towards a goal, whether academic, occupational, or health-related. Instead of assuming that people will or will not perform a behavior based on the reward or punishment they might receive afterward, this model describes a person's motivation in terms of the autonomy they feel they have (O'Hara, 2017).

Motivation is described as "psychological energy directed at a particular goal" (Patrick & Williams, 2012). Traditional concepts of motivation include extrinsic (external) motivation (when someone is motivated by an external reward) and intrinsic (internal) motivation (when someone enjoys the behavior itself). Intrinsic motivation is considered the most powerful and long-lasting type of motivation, and is therefore valued much more than extrinsic motivation.

Intrinsic motivation is still identified as doing something simply for the sake of doing it, because the person enjoys the behavior itself. But the expansion of extrinsic motivation into a continuum also recognizes that, particularly in health behaviors, someone can value a behavior and be strongly motivated without actually enjoying it. Some behaviors may always be motivated by extrinsic factors, such as "eating your vegetables". A person can also have several types of motivations for their health behaviors, and can move between these levels of extrinsic motivation over time (Patrick & Williams, 2012).

The SDT is further built on the concept that humans have 3 basic psychological needs that influence their motivation: autonomy, relatedness, and competence. Autonomy is the sense of being in control of one's life and making one's own decisions. Relatedness refers to the social connections a person has with others, particularly supportive ones. Competence describes the person's perceptions of their own capabilities relative to achieving their goal - essentially their self-efficacy. For a person to develop longer-lasting, more powerful extrinsic motivation, they need to have these three needs met (Patrick & Williams, 2012).

Reference

O'Hara, D. (2017). The intrinsic motivation of Richard Ryan and Edward Deci. American Psychological Association www.apa.org

Patrick, H., & Williams, G. C. (2012). Self-determination theory: Its application to health behavior and complementarity with motivational interviewing. International Journal of Behavioral Nutrition and Physical Activity, 9(1), 18. doi.org/10.1186/1479-5868-9-18

This page titled 4.3.4: Self-Determination Theory is shared under a CC BY 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 13.6: Self-Determination Theory by Erin Calderone is licensed CC BY 4.0.

4.3.5: Transtheoretical Model AKA-Stages of Change

Unlike previous theories, which mostly describe why a person engages in a particular behavior or the antecedents (prerequisites) of behavioral change, the Transtheoretical Model (TTM), also known as the Stages of Change, instead describes the process of behavior change. Drawing from several different behavioral theories (hence the name), psychologists James Prochaska and Carlo DiClemente developed the TTM in the late 1970's. The TTM makes the (perhaps obvious) assertion that behavioral change is not immediate: people do not wake up one morning and start exercising and eating a healthy diet, nor does someone quit smoking overnight. Instead, behavior change is a process, and not even a linear one - people usually enter at the first stage, but may then exit or re-enter at any stage in a somewhat circular fashion. Each stage in the TTM is based on the person's individual readiness to change their behavior (LaMorte, 2022; McKenzie et al., 2017). Below are the 5 stages, each with a description:

1. **Precontemplation.** Before a person decides to change their behavior, they may be unaware of the risks of not changing, or they may be resistant to change. In this stage, a person has no intention of changing their behavior in the next 6 months.
2. **Contemplation.** At this stage, a person is considering changing their behavior over the next 6 months and may be weighing the pros and cons of doing so. Barriers can seem insurmountable, and it may be difficult to see the path forward, especially if the person lacks self-efficacy in this area.
3. **Preparation.** This stage begins when the person intends to change their behavior in the near future, usually within the next month. They may have already started making a few small changes, be in the process of planning how to change their behavior, and believe this is important.
4. **Action.** A person in the action stage has begun to change their behavior recently (within the last 6 months). The risk of relapse is high in this stage.
5. **Maintenance.** This stage is reached when the new behavior has been relatively consistent for 6 months or more. A person in the maintenance stage intends to continue this behavior, and the longer they do so, the more it becomes a part of their lifestyle.

Relapse, or exiting the stages of change and reverting back to old behavior patterns, can occur at any stage, but is less likely the longer a person stays in maintenance. A sixth stage, called termination, occurs when the new behavior is so ingrained in the person's lifestyle that they have no risk of relapse. For many health behaviors, termination is impossible since the temptation to go back to old behaviors still lingers, or since barriers to the behavior must still be planned for and overcome. Most public health practitioners will therefore not use the termination stage (LaMorte, 2022; McKenzie et al., 2017).

Any and all of the aforementioned behavioral change models can be potentially useful in helping people change their behavior. They might be used by medical professionals, addiction specialists, counselors and therapists, or nutrition and fitness practitioners as helpful tools. However, some of them may have slight conflicts with public health goals. For example, SDT values autonomy in decision-making. Therefore, if a person decides that they do not want to quit smoking, that choice should be affirmed by practitioners (Sheeran et al., 2020). This obviously conflicts with a public health interest of reducing smoking behaviors! Another potential problem with these models is that they focus exclusively on the individual - their experiences, motivations, and/or sense of behavioral control (aka self-efficacy, or competence). Social influences are recognized in several models, whereas other influences, such as environment, politics and public policy, health literacy, access, and economic variables, are not. These models describe how an individual may change their own behaviors, but not necessarily how to nudge a group, community, or larger population toward health-behaviors. Therefore, we need to "zoom out" and examine human behavior in the broader context of the community.

Reference

LaMorte, W. W. (2022). The transtheoretical model (stages of change). Boston University School of Public Health. www.sphweb.bumc.bu.edu

LaMorte, W. W., . (2022). The social cognitive theory. Boston University School of Public Health. www.sphweb.bumc.bu.edu

McKenzie, J. F., Neiger, B. L., & Thackeray, R. (2017). Planning, implementing, and evaluating health promotion programs: A primer (7th ed.). Pearson Education.

Sheeran, P., Wright, C. E., Avishai, A., Villegas, M. E., Lindemans, J. W., Klein, W. M. P., Rothman, A. J., Miles, E., & Ntoumanis, N. (2020). Self-determination theory interventions for health behavior change: Meta-analysis and meta-analytic structural equation modeling of randomized controlled trials. Journal of Consulting and Clinical Psychology, 88(8), 726–737. doi.org/10.1037/

This page titled 4.3.5: Transtheoretical Model AKA-Stages of Change is shared under a CC BY 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 13.7: Transtheoretical Model (Stages of Change) by Erin Calderone is licensed CC BY 4.0.

4.3.6: The Social-Ecological Model

The Social-Ecological Model is a framework for identifying the causes, risk factors, and protective factors that contribute to health outcomes in a community and populations at large. This model asserts that health outcomes - and perhaps more specifically, health behaviors - are influenced by the interaction between an individual, their community, and the physical, social, and political environments in which they live.

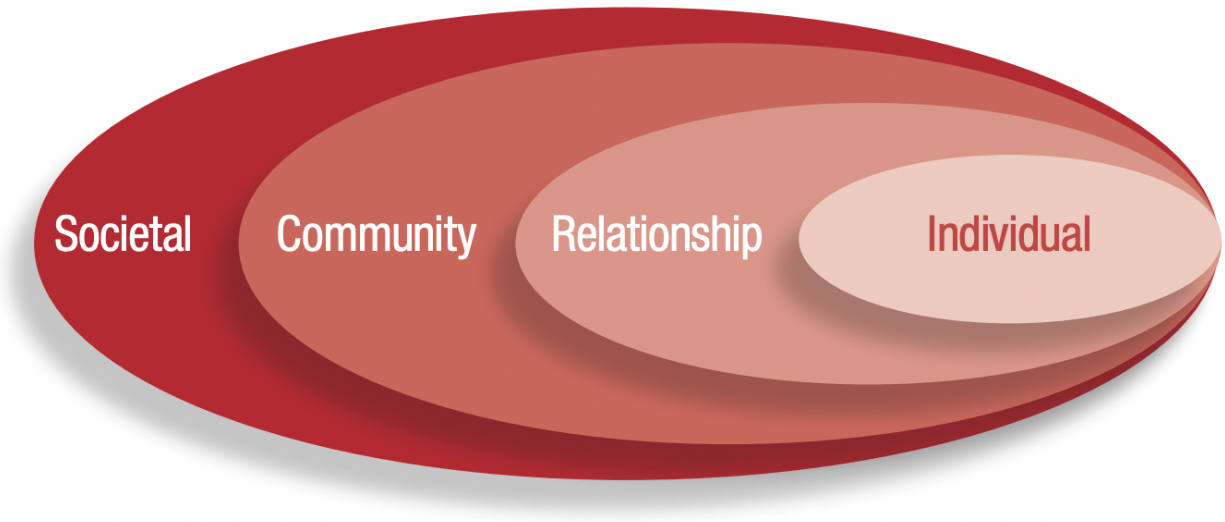


Figure 4.3.6.1: The Social Ecological Model is depicted as a series of overlapping, nested circles representing four distinct levels of influence: (1) the individual is influenced by the (2) relationships they have, the (3) community, and the (4) society they live in. Each circle describes specific risk or protective factors for a health outcome and therefore provides opportunities for public health approaches at each level. (Public Domain, via CDC)

Individual

The individual circle includes each person's risk and protective factors. Genetics, age, personal history, education, income, attitudes, beliefs, and behaviors are included in this circle. All of these factors can make a person more or less likely to engage in a specific health behavior and affect their health status. For example, a person who experienced childhood trauma or abuse may be more likely to abuse drugs or drink alcohol. Someone who never graduated from high school may earn less income over their lifetime, and therefore not have consistent access to healthcare, or even avoid going to the doctor out of concern about the medical costs. In a more positive example, a person who experienced the benefits of a healthy diet and physical activity as a child is more likely to continue those habits into adulthood, particularly because they may have a positive attitude towards nutrition and exercise.

Relationships

Relationships with other people are highly influential in a person's attitudes, beliefs, and behaviors - and vice versa - these relationships are influenced by that person. Primary relationships are especially important and include a significant other or spouse, parents, siblings, children, and close friends. If a person is part of an abusive relationship, they will probably be more likely to be the victim of or to perpetrate violence. Conversely, if a person has a physically active friend group, they are more likely to engage in physical activity themselves.

Community

The community level includes the organizations the individual is part of and the broader social context in which they live. This

could also include the built environment and the socio-political landscape of that person's community. An example of this is the social support provided by schools, churches, and sports and recreation clubs. A built environment could encourage less stress and physical activity through accessible parks and green spaces, or it could promote higher stress levels and alcohol consumption through high-traffic roads and several liquor stores in the neighborhood.

Societal

At the societal level, we also have social norms, macroeconomic and political factors, and environments that affect health outcomes. For example, social norms around alcohol consumption influence alcohol use at young ages, alcohol abuse, and addiction. Economic poverty is associated with higher crime rates, drug abuse, and mental illness. Political administrations can create laws that support or undermine public health efforts, and either provide or cut funding to public health programs (Centers for Disease Control and Prevention, 2025; McKenzie et al., 2016).

Reference

Centers for Disease Control and Prevention. (2025). About violence prevention. CDC www.cdc.gov

McKenzie, J. F., Neiger, B. L., & Thackeray, R. (2017). Planning, implementing, and evaluating health promotion programs: A primer (7th ed.). Pearson Education.

This page titled 4.3.6: The Social-Ecological Model is shared under a CC BY 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 13.8: The Social-Ecological Model by Erin Calderone is licensed CC BY 4.0.

4.3.7: Community Intervention Models

The social-ecological model identifies several potential areas for intervention and health promotion within a community at each level of the model. 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). Given the group dynamics, physical environments, and political power structures in every community, we cannot necessarily apply the same behavior change theories to a group as we might to an individual. Several researchers have described different approaches to community interventions, some of which emphasize looking for deficits (needs-based) and others that emphasize identifying what is already working well (strengths-based). These models work through social action, advocacy, capacity building, grassroots organizing, and leadership development to drive positive change (Seabert et al., 2021).

Community-based health promotion programs often take a holistic approach: they are not limited to a single location (such as a hospital), they often include multiple, coordinated interventions, and they may also focus on environmental and policy changes to support the desired behaviors (Merzel & D'Afflitti, 2003). According to McLeroy et al. (2003), most community-based interventions fall into four major models. Most successful community interventions are not only multi-faceted, but they also utilize more than one of these models.

Community as a setting

Sometimes, the community is simply the geographic location where 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 (such as billboards, paper flyers, radio, TV, or YouTube advertisements) may be used to convey specific health messaging. When the community is the setting, the intervention's goal is to elicit personal behavioral change. Therefore, any improvement in population health is the sum of all the individual behaviors. This model may fail to address environmental, economic, or political influences on behavior and health.

Community as a target

Interventions that target the community seek to change 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 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 leverage the people and resources within the community to 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 leverage and support current resources, or they might ask community members themselves to identify the highest priority 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" by supporting the community itself in identifying needs, developing solutions, and implementing them. This model might fail to address disparities in the social determinants of health that many communities face, such as economic, environmental, and policy factors.

Public health interventions are 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) state:

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.

Reference

McKenzie, J. F., Neiger, B. L., & Thackeray, R. (2017). Planning, implementing, and evaluating health promotion programs: A primer (7th ed.). Pearson Education.

McLeroy, K. R., Norton, B. L., Kegler, M. C., Burdine, J. N., & Sumaya, C. V. (2003). Community-Based interventions. American Journal of Public Health, 93(4), 529–533. doi.org/10.2105/ajph.93.4.529

Merzel, C., & D'Afflitti, J. (2003). Reconsidering community-based health promotion: Promise, performance, and potential. American Journal of Public Health, 93(4), 557–574. doi.org/10.2105/ajph.93.4.557

Seabert, D., McKenzie, J. F., & Pinger, R. R. (2021). McKenzie's an introduction to community & public health. Jones & Bartlett Learning.

This page titled 4.3.7: Community Intervention Models is shared under a CC BY 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 13.9: Community Intervention Models by Erin Calderone is licensed CC BY 4.0.

4.3.8: Mobilizing Action through Planning and Partnerships (MAPP)

The Mobilizing Action through Planning and Partnerships (MAPP) model was originally created in 2001 through a partnership between the Centers for Disease Control and Prevention and the National Association of County and City Health Officials (NACCHO). It has since been updated to MAPP 2.0, which "emphasizes community engagement, data-driven assessments, and a focus on health equity" (NACCHO, 2024). The redesigned MAPP model emphasizes recognizing the social determinants of health and the social inequities that cause them, including power dynamics, and involves the community in the decision-making process. The MAPP 2.0 uses the following 3 phases (Clayton et al., 2020):

Phase 1:

Building the Community Health Improvement (CHI) Foundation. This phase involves identifying the people in the community who will have an effect on the program and whom the program will affect - the stakeholders. A committee is then formed from these stakeholders, and a shared community vision is established. In this phase, the project's resources, budget, and administrative organization are established.

Phase 2:

Tell the Community Story. This is where the community assessments are designed and performed. There are three assessments as part of the MAPP:

Community Partner Assessment:

Community partners, such as local government agencies, non-profit organizations, medical offices, hospitals, schools, community health centers, faith-based institutions, and private businesses, can assess their strengths and capacities to improve community health and health equity.

Community Status Assessment:

Data collected on demographics, current health status, and health inequities of community members. This includes health behaviors and social determinants of health, as well as the systems of power that influence health outcomes.

Community Context Assessment:

The historical and current socio-political context of the community includes the "community strengths and assets, built environment, and forces of change". This assessment relies on the views and lived experiences of people affected by health inequities (NACCHO, 2023).

Phase 3:

Continuously Improve the Community. The MAPP involves an ongoing process of community engagement, prioritization of issues, analysis of power (factors, people, and institutions that contribute to health), developing long-term goals and measures of success, creating action plans including short-term objectives, and finally setting up ongoing evaluation and assessment for continuous improvement (Clayton et al., 2020, NACCHO, 2023).

Reference

Clayton, A., Verma, P., & Weller Pegna, S. (2020). MAPP Evolution Blueprint Executive Summary. National Association of County and City Health Officials (NACCHO). www.naccho.org

NACCHO. (2023). MAPP 2.0 User's Handbook. NACCHO www.naccho.org

This page titled 4.3.8: Mobilizing Action through Planning and Partnerships (MAPP) is shared under a CC BY 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 13.11: Mobilizing Action through Planning and Partnerships (MAPP) by Erin Calderone is licensed CC BY 4.0.

4.3.9: PRECEDE-PROCEED Model

PRECEDE-PROCEED is an acronym that defines the planning and implementation stages of a community health intervention.

PRECEDE

stands for Predisposing, Reinforcing, and Enabling Constructs in Educational Diagnosis and Evaluation. This model attempts to “reverse engineer” the program by starting with identifying the desired outcome and then working backwards to design the intervention. While this may certainly sound daunting, it’s really describing a process of assessing the needs and context of the community, including the following phases (McKenzie et al., 2017; Rural Health Information Hub, 2025; University of Kansas, 2025):

Phase 1:

Social assessment and situational analysis. A social assessment identifies the subjective needs of a population, including quality of life, perceptions of safety, and the community's own goals and aspirations. This requires substantial input from community members about their subjective experiences, needs, and desires. This might include surveys, telephone or face-to-face interviews, focus groups, or questionnaires. The goal of this phase is to envision the ultimate outcome that the community wants to achieve.

Phase 2:

Epidemiological assessment. This level of data collection and assessment involves more objective measures, including mortality and morbidity rates, disability status, and behavioral, genetic, and environmental factors influencing health outcomes. Prioritizing health problems in this phase is important, as is connecting them to the community's subjective needs and desires (identified in phase 1). Program planners will need to use both scientific evidence and an understanding of the community's resources and priorities to appropriately prioritize health problems. For example, the program planner may identify that rates of type II diabetes are higher in the community than the national average, and community members might therefore benefit from a Diabetes Prevention Program (DPP). However, community members may identify that residential street safety is a much more pressing concern in phase 1. If the program planner tries to “shoehorn” or force their agenda onto the community intervention, however well-intentioned, it may not be well received and, at worst, lead to public distrust of health interventions.

Phase 3:

Educational and ecological assessment. This last level of assessment seeks to identify the factors that influence behaviors, lifestyles, and health risks in the community. These include predisposing, enabling, and reinforcing factors (described earlier). Factors can include a lack of access or resources, an educational or informational gap, environmental influences, policies, or something else. Often, there are multiple factors that influence a health risk, necessitating multiple components in the intervention to address them.

Phase 4:

Health program and policy development. At this stage, the program is being designed based on the findings from the previous assessments, along with “best evidence” or “best practice” (using scientific evidence and/or behavioral change theory). The program should be connected to both the social assessment and the epidemiological assessment and should focus on the factors identified as predisposing, enabling, and/or reinforcing behaviors in phase 3. Another key component of this phase is to do an administrative and policy assessment, which determines two things: whether or not existing resources - including funding and personnel - are available and adequate to implement the program, and if there are any policies (local laws, regulations, etc.) that may influence the program implementation. An example of this might be a program designed to offer exercise sessions in a local park, which would require the program planner to check with the city parks and recreation office to find out if a contract or memorandum of understanding (MOU) is required, if liability insurance is adequate, and if there are any requirements for participants to sign liability waivers or other paperwork. Personnel may need to be hired and trained to lead exercise sessions, and equipment may need to be purchased.

PROCEED

The second part of the model is the acronym PROCEED, which stands for Policy, Regulatory, and Organizational Constructs in Educational and Environmental Development. This is the process of implementing and evaluating the intervention developed in the first four phases, as well as evaluating each component. Once again, there are 4 phases dedicated to this process, outlined below (McKenzie et al., 2017; Rural Health Information Hub, 2025; University of Kansas, 2025):

Phase 5: Implementation.

This is where the intervention actually takes place! Phase 5 might include a pilot program and/or a phasing-in process. It may be helpful to use a project management tool to ensure that each piece of the program is implemented in the right order. Phases 6 and 7 can be conducted during the program to provide valuable feedback to improve it.

Phase 6: Process evaluation.

Is the program being implemented as planned? This evaluation seeks to determine whether the intervention's activities are actually being delivered. For example, are health education sessions being offered? Did some need to be canceled? If so, why? What can be done to address implementation problems early on so the program is actually completed as promised?

Phase 7: Impact or short-term evaluation.

This evaluation assesses the program's impact on knowledge, behaviors, or environmental objectives. These might be intermediate or short-term assessments, conducted in the middle and at the end of the program. For example, if the program offers health education courses with the objective of improving participants' knowledge of healthy eating patterns, has that knowledge actually improved? Do they score higher on a questionnaire about healthy eating? Conducting impact assessments during the program also helps identify whether changes are needed to improve its effectiveness.

Phase 8: Outcome or long-term evaluation.

The final assessment should be on the outcome objectives, which are typically the ultimate desired changes to health status for the community. Some of these changes may take years or even decades to be demonstrated. For example, the ultimate goal for a community might be to reduce cardiovascular disease (CVD) rates. However, many of the participants in the community program might not be at risk for developing cardiovascular disease for several years, but the program activities may be helping them to prevent CVD. Sometimes a different marker can be targeted that is associated with the ultimate goal - such as an improvement in cardiovascular fitness, a reduction in body mass index (BMI), or lower blood cholesterol levels - but these will need to be maintained over the years in order to reach the ultimate goal of CVD prevention.

Reference

Rural Health Information Hub. (2025). PRECEDE-PROCEED model. Rural Health Promotion and Disease Prevention Toolkit. The Rural Health Information Hub. www.ruralhealthinfo.org

McKenzie, J. F., Neiger, B. L., & Thackeray, R. (2017). Planning, implementing, and evaluating health promotion programs: A primer (7th ed.). Pearson Education.

University of Kansas. (2025). Chapter 2. Other models for promoting community health and development. Community Tool Box. University of Kansas Center for Community Health and Development. www.ctb.ku.edu

This page titled 4.3.9: PRECEDE-PROCEED Model is shared under a CC BY 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 13.12: PRECEDE-PROCEED Model by Erin Calderone is licensed CC BY 4.0.

4.3.10: Diffusion of Innovation

The Diffusion of Innovation Theory is a widely used population-based theory. It is used in public health programs to promote healthy behaviors and improve population health outcomes. This theory helps us understand the spread of information and the adoption of a new intervention. It first emerged in the agricultural sector, where farmers were observed to adopt new technology to varying degrees, and has since gained popularity in other sectors to drive innovation. The theory contains 4 parts:

1. **Innovation** is an idea, practice, or object perceived as new. The population within the social system has certain characteristics, such as perceiving when to implement the innovation. These characteristics are: relative advantage (whether the innovation is perceived as better than previous ideas), compatibility (how well the innovation is perceived to fit with values and experience), complexity (the degree of difficulty to understand or use the innovation), trialability (how much someone can experiment or practice with the technology before adoption), observability (the degree to which the results of the innovation are visible) (Riegelman & Kirkwood, 2025).
2. **Channels** are the way messages get from one person to another.
3. **Time** is the time it takes to move through the innovation decision process and the rate of adoption within a social system.
4. **Community** is a set of interrelated units that work together to reach a common goal. This could be a group of physicians who have agreed to try a new treatment, or a group of organizations that work within a county to reduce homelessness. The community affects the flow of information and the spread of diffusion.

Some applications of the Diffusion of Innovations Theory can be seen in vaccination and healthy-eating campaigns. The Diffusion of Innovations Theory focuses on strategies to be applied across different parts of society to bring about change (Iqbal & Zahidie, 2021).

Reference

Iqbal, M., & Zahidie, A. (2021). Diffusion of innovations: a guiding framework for public health. 50(5): 533-537. Scandinavian Journal of Public Health. doi:10.1177/14034948211014104

Riegelman, R, & Kirkwood, B (2025). Public Health 101 Improving Community Health (4th ed). Jones & Bartlett Learning, LLC.

This page titled 4.3.10: Diffusion of Innovation is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

4.4: Influence of Change Health Behavior

The following are emerging approaches that researchers and program managers are using to change behavior:

Behavioral economics

Behavioral economics applies insights from psychology to understand and influence how people make decisions about their health. It acknowledges that individuals don't always act rationally; instead, their choices are often shaped by emotions, social influences, and their surroundings. By recognizing these factors, public health initiatives can be designed to be more effective and efficient, ultimately leading to better health outcomes (Matjasko et al., 2016).

Some ideas of how behavioral economics influence health decisions include (Riegelman & Kirkwood, 2025 p96):

1. **Loss aversion.** This concept identified that people tend to opt for incentives to avoid potential loss. For example, if a reward of $10 is given after every 10 sessions, it could be more effective to offer a larger sum, say $100, at the end of the program. However, this bigger incentive would come with a catch: each missed session would result in a deduction from that final payment. This approach leverages the psychological principle of loss aversion, where the fear of losing something is a stronger motivator than the prospect of gaining something
2. **Timely reminders.** Reminders work best right before someone needs to act. For example, people are more apt to take the stairs if they see a prompt right before reaching the elevator.
3. **Power of default.** It turns out, we often stick with the easiest option. When faced with a pre-selected choice, most people will simply accept it rather than actively choose something else. For example, this tendency to go with the default has been seen in patients' selection of health insurance plans and even end-of-life care.

Social marketing

Social marketing is a field that uses commercial marketing principles to influence behavior changes that benefit society rather than individual profit. It aims to promote positive social change, such as encouraging healthy behaviors, addressing environmental issues, or improving community well-being. Recently, public health has used social marketing to understand and change community health behaviors, and it has proven successful. Some examples of these social marketing campaigns are (Riegelman & Kirkwood, 2025 p96):

- The Truth campaign was put forth by the American Legacy Foundation. The "truth" campaign set out to change social norms and significantly reduce smoking among teenagers aged 12-17. In its initial four years, the campaign successfully prevented 450,000 young people from smoking and saved an estimated $45.4 billion in medical care costs within its first two years alone. (National Social Marketing Centre, n.d.).
- The VERB campaign was funded by the Centers for Disease Control and Prevention. The VERB program targeted 9- to 13-year-olds, aiming to make exercise seem fun and cool for everyone, not just those who play competitive sports. The VERB was a five-year program, and by the fourth year, findings revealed a clear link: the more tweens were exposed to the VERB™ campaign, the more physically active they were (National Social Marketing Centre, n.d.).

Social marketing incorporates the 4 P's of traditional marketing (Riegelman & Kirkwood, 2025, p97):

1. **Product**: Identifying the behavior being marketed
2. **Price**: Identifying the benefits, challenges, and costs
3. **Place**: Identifying the group and how to reach them
4. **Promotion**: Identify the campaign to reach the group

Reference

Matjasko, J.L., Cawley, J.H., Baker-Goering, M.M., Yokum, D.V. (2016). Applying Behavioral Economics to Public Health Policy: Illustrative Examples and Promising Directions. American Journal of Preventive Medicine 50(5 Suppl 1):S13-S19. doi: 10.1016/j.amepre.2016.02.007

National Social Marketing Centre. (n.d). Truth. National Social Marketing Centre www.thensmc.com/resources/showcase/truth

National Social Marketing Centre. (n.d). VERB. www.thensmc.com/resources/showcase/VERB

Riegelman, R. & Kirkwood, B. (2025). Public Health 101 Improving community health (4th ed). Jones and Bartlett, LLC.

This page titled 4.4: Influence of Change Health Behavior is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

4.5: PREVALENT HEALTH CONCERNS THROUGH THE LIFE PHASES

While the prevention of both infectious and chronic diseases is certainly a primary focus of public health, there are a myriad of community health concerns that affect population health across the lifespan. Individuals and communities have varying needs for support to maintain health across different stages of life. It is essential to understand the public health issues addressed in each life phase. This section will cover major public health concerns related to maternal and reproductive health, infant health, adolescence, across adulthood, and into the “golden” years of old age. The focus will remain on community health issues in the United States, but we may occasionally compare data with other nations.

4.5.1: Maternal, Infant and Child

4.5.2: Adolescent and Adulthood

4.5.2.1: Unintentional Injuries

4.5.2.2: Violence

4.5.2.3: Drug Abuse and Addiction

4.5.2.4: Tobacco Use

4.5.2.5: Nutrition

4.5.2.6: Physical Activity and Fitness

4.5.2.7: Obesity

4.5.2.8: Mental Health

This page titled 4.5: Prevalent Health Concerns through the Life Phases is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

4.5.1: Maternal, Infant and Child

Maternal Health

Many factors affecting an individual's health may be at play prior to 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 the physical and mental health of the pregnant person during and after pregnancy.

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 died in 2021 (Centers for Disease Control and Prevention, 2019). 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, 2021). 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.

If maternal mortality rates in the U.S. have remained stable over the last several years (which is not the case, as explained in the prior paragraph), they are still comparable or slightly higher than those of other countries with similar economic profiles and medical technology (Organisation for Economic Cooperation and Development, 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. Much of this risk stems from access to healthcare, including a shortage 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 (World Health Organization, 2024):

- severe bleeding (mostly bleeding after childbirth);
- infections (usually after childbirth);
- high blood pressure during pregnancy (pre-eclampsia and eclampsia);
- complications from delivery;
- unsafe abortion

Infant Health

Infant mortality is defined as the death of an infant between the day they are born and 1 year old. The most recent report from the National Center for Health Statistics (NCHS) shows a 3% increase in the U.S. infant mortality rate from 2021 (19,928) to 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 (National Institute of Health, 2021; Ely & Driscoll, 2023):

- congenital malformations
- premature birth and low birth weight
- sudden infant death syndrome (SIDS)

- unintentional injuries (accidents)
- maternal complications of pregnancy.

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, is collectively called Fetal Alcohol Spectrum Disorders.
- Other drugs, such as cocaine and heroin, which are associated with withdrawal symptoms after birth, 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., 2022),
- Radiation, which is associated with an increased risk for miscarriage, growth restriction, birth defects (including impaired brain function and malformations), as well as cancers (Centers for Disease Control and Prevention, 2025).

Birth Defects

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** (incomplete formation of the brain and skull, which typically causes death shortly after birth) and **spina bifida** (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 (Centers for Disease Control and Prevention, 2025).

Infectious diseases

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, the syphilis pathogen is a bacterium that is treatable with penicillin (an antibiotic), even during pregnancy. **Rubella** is a virus that 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 (it is recommended that pregnant women do not clean litter boxes). Although there might not be any symptoms present at birth, infants can develop severe brain and eye damage from congenital infection later on (Centers for Disease Control and Prevention, 2025). **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 (Centers for Disease Control and Prevention, 2025).

Reproductive Healthcare and Family Planning

Planning for pregnancy and parenthood helps ensure that appropriate resources and support systems are in place and that the health of the whole family is considered. This process may include considerations to improve parental fertility, prevent exposure to teratogens, ensure adequate nutrition (including folic acid supplementation), and support the physical and mental health of the entire family. It can also include planning for parental leave from work, financial commitments (such as physician visits, labor and delivery, daycare, school, etc.), and studying parenting styles. Yet, nearly half of pregnancies in the U.S. are unintended, and have an increased risk of exposure to teratogens, delayed prenatal care (or lack thereof), and risk factors from other social determinants of health (Seabert et al., 2022).

Childhood Health

Childhood is a pivotal time for growth and development. Most of us can remember childhood experiences that shaped who we are as adults. Many of the health beliefs and behaviors we have as adults were first introduced during those early years, and conditions that begin in childhood (like obesity) often persist into adulthood.

Childhood can be characterized by different developmental stages, but is generally considered to be after infancy (over 1 year old) and before puberty and the teen years. In this section, we'll go over the leading health issues among American children ages 1 to 14. We'll also examine one of the simplest and perhaps most comprehensive ways to improve childhood health: through the public school system.

As of 2022, the National Center for Health Statistics reports that 1.5% of children under 4 and 2.2% of children aged 5-11 are in fair or poor health. Additionally, 8% of elementary school-aged children missed 11 or more days of school due to illness, injury, or disability (National Center for Health Statistics, 2025). Although it might seem that this indicates the majority of children in the U.S. are healthy, there are also significant health risks affecting this country's children more than those of other similarly economically developed countries.

Morbidity and Mortality

In 2022, 4,156 U.S. children under 4 (28.0 per 100,000 population) and 6,239 children between 5 and 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 (National Center for Health Statistics, 2025):

- 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 risk of 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., 2022). A very concerning trend is that of firearm injuries and deaths. If we combine the 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, 2025). Violence is a significant public health problem, particularly for children and youth.

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, as well as developmentally appropriate education. Certainly, no parents or caregivers are “perfect”, and there is a wide array of parenting styles that can promote healthy growth and behaviors. The most important thing is to protect children from adverse childhood experiences, which can substantially impact their current and future health and well-being, as well as that of future generations.

Child maltreatment

Child maltreatment includes neglect and abuse of any form (physical, sexual, psychological). Failing to provide children with food, water, clothing, medicine, and supervision is 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 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 adverse childhood experiences 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 (Centers for Disease Control and Prevention, 2024; Seabert et al., 2022).

Vaccinations

Children should also receive routine vaccinations to prevent deadly infectious diseases. Thanks to programs like Vaccines for Children, which provide free immunizations to poor, uninsured, and underinsured children, vaccine availability is quite high in the U.S. However, misinformation in recent years has led some parents to avoid or delay vaccination, thereby decreasing population immunity and increasing the risk of outbreaks, even among vaccinated children (Seabert et al., 2022).

Childhood obesity

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 (i.e., comparing it to other children/teens of the same age and gender). A child or teen with a BMI above the 95th percentile is considered obese. Due to the nonlinear pattern of growth during childhood and adolescence, it is typical for children to go through phases of greater or lesser body fat, which 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 (Centers for Disease Control and Prevention, 2024).

Reference

Centers for Disease Control and Prevention. (2022). Four in 5 pregnancy-related deaths in the U.S. are preventable. CDC archive.cdc.gov

Centers for Disease Control and Prevention. (2024). About child abuse and neglect. CDC www.cdc.gov

Centers for Disease Control and Prevention. (2024). Childhood obesity facts. CDC www.cdc.gov

Centers for Disease Control and Prevention. (2025). Radiation and pregnancy: Information for clinicians. CDC. www.cdc.gov

Centers for Disease Control and Prevention. (2025). Folic acid: The best tool to prevent neural tube defects. CDC www.cdc.gov

Centers for Disease Control and Prevention. (2025). About Toxoplasmosis. CDC www.cdc.gov

Centers for Disease Control and Prevention. (2025). Congenital Zika syndrome and other birth defects. CDC www.cdc.gov

Ely, D. M., & Driscoll, A. K. (2023). Infant mortality in the United States: Provisional data from the 2022 period linked birth/infant death file. National Center for Health Statistics (U.S.). dx.doi.org/10.15620/cdc:133699

Hoyert, D. L. (2021). Maternal mortality rates in the United States, 2021. National Center for Health Statistics. CDC www.cdc.gov

National Center for Health Statistics (2025). Child health. CDC www.cdc.gov

National Institute of Health. (2021). Infant mortality. Eunice Kennedy Shriver National Institute of Child Health and Human Development www.nichd.nih.gov

Organisation for Economic Cooperation and Development. (2023). Health at a glance 2023: OECD Indicators. OECD. dx.doi.org/10.1787/7a7afb35-en

Panchal, N. (2025). The impact of gun violence on children and adolescents. KFF www.kff.org

World Health Organization. (2024). Maternal mortality. WHO. www.who.int

Seabert, D., McKenzie, J. F., & Pinger, R. R. (2022). McKenzie's An Introduction to Community & Public Health. Jones & Bartlett Learning.

Schneider, M. J. (2020). Introduction to public health. Jones & Bartlett Learning.

This page titled 4.5.1: Maternal, Infant and Child is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

- 9.2.1: Maternal Mortality by Erin Calderone is licensed CC BY 4.0.
- 9.2.2: Infant Health and Mortality by Erin Calderone is licensed CC BY 4.0.
- 9.6: Childhood Health by Erin Calderone is licensed CC BY 4.0.
- 9.6.1: Leading Causes of Morbidity and Mortality by Erin Calderone is licensed CC BY 4.0.
- 9.6.2: Health Concerns for Children by Erin Calderone is licensed CC BY 4.0.

4.5.2: ADOLESCENT AND ADULTHOOD

Although many major health issues that affect children also affect adolescents and adults, populations face distinct challenges as they progress from the teen years into adulthood. Note that infectious and chronic diseases will be covered in other chapters; here, we will focus on psychological and behavioral factors that impact health.

Mental health (a term often used interchangeably with psychological or emotional health) is increasingly being recognized as a significant factor in overall health and well-being. As children become more independent from their caregivers, the use and abuse of substances and other health-risk behaviors become more pertinent. Young American adults suffer from mental health and substance use issues, as well as violence and unintended injuries, both of which are significant sources of morbidity and mortality. On the other hand, health-promoting behaviors, such as healthy nutrition and regular physical activity, play a crucial role in promoting well-being and longevity. Although the consequences of poor nutrition and a sedentary lifestyle may begin to harm health in childhood and adolescence, the risks and impact associated with obesity and poor fitness tend to increase as we age. While the term “behavioral health” typically refers to mental health services in medical practice, we will examine these topics in relation to health behaviors and their impact on adolescent and adult populations.

4.5.2.1: Unintentional Injuries

4.5.2.2: Violence

4.5.2.3: Drug Abuse and Addiction

4.5.2.4: Tobacco Use

4.5.2.5: Nutrition

4.5.2.6: Physical Activity and Fitness

4.5.2.7: Obesity

4.5.2.8: Mental Health

This page titled 4.5.2: Adolescent and Adulthood is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

4.5.2.1: Unintentional Injuries

The leading cause of death for Americans between 1 year of age and 44 years of age is unintentional injuries, or accidents. This rather broad category includes accidental poisoning and drug overdoses, automobile accidents, and unintentional falls. Of these, accidental poisoning (including drug overdoses) caused the highest number of deaths, killing 112,728 Americans in 2022. (Centers for Disease Control and Prevention, 2024; Centers for Disease Control and Prevention, 2022).

Susceptibility to different types of injuries varies by age. While drowning poses the largest threat to those under 4, older children and teens have higher rates of injuries from motor vehicle accidents and gun-related accidents. Drug overdoses are a higher risk for young, middle-aged, and older adults, while falls tend to be the highest risk for those over 75 (Seabert et al., 2021). Across all ages, hazardous behaviors and environments increase the risk of harm.

Motor vehicle crashes continue to be a significant cause of death and injury across the lifespan. In spite of lockdowns and stay-at-home orders during the COVID-19 pandemic years, data suggest that Americans were driving more recklessly - motor vehicle accident deaths spiked in 2020 and didn't begin to decline until 2022. Even though there were fewer cars on the road, it is likely that reckless driving, driving under the influence of drugs or alcohol, and not wearing seatbelts contributed to an increase in accidents and deaths (U.S. Government Accountability Office, 2022). Perhaps because there were fewer cars on the road, this enabled higher speeds and more dangerous driving. There are also likely psychological and socioeconomic factors that may have influenced driving behavior. In terms of injury prevention, significant progress has been made in designing safer vehicles and roads. Yet the use of technology in vehicles has been mixed: while texting and taking phone calls (even hands-free) are distracting to drivers, the development of automatic safety features promises to help drivers prevent accidents altogether (National Highway Traffic Safety Administration, n.d.). Historically, epidemiology and public health efforts have played a significant role in reducing deaths and injuries.

Reference

Centers for Disease Control and Prevention. (2024). Injuries and Violence Are Leading Causes of Death. CDC www.cdc.gov

Centers for Disease Control and Prevention. (2022). Drug Overdose Deaths in the United States, 2001–2021. CDC www.cdc.gov

National Highway Traffic Safety Administration. (n.d.). Driver assistance technologies. U.S. Department of Transportation www.nhtsa.gov/vehicle-safety

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

U.S. Government Accountability Office. (2022). During COVID-19, road fatalities increased and transit ridership dipped. U.S. GAO. www.gao.gov

This page titled 4.5.2.1: Unintentional Injuries is shared under a CC BY 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 10.2: Unintentional Injuries by Erin Calderone is licensed CC BY 4.0.

4.5.2.2: Violence

While violence may be considered by some to be a criminal justice or policing issue alone, it is also a public health issue because it affects the lives and health of the public. Violence, including self-inflicted harm, contributes to some of the leading causes of death for young people. Suicides are now the second leading cause of death for those between the ages of 1 and 44, while homicides have been in the top 5 since the 1980s (Centers for Disease Control and Prevention, 2024).

Violent behavior is influenced by a variety of factors. Personal factors include psychological trauma, particularly that which is experienced during developmental stages in childhood. Children who experience Adverse Childhood Experiences (ACEs) and high levels of family stress may, as adults, have heightened "fight or flight" responses and may not have learned cooperative coping mechanisms for interpersonal conflict, such as empathy and problem-solving. Community factors include many of the social determinants of health, such as job opportunities, social cohesion, and witnessing violence as children. Overall, violence seems to create more violence; victims of abuse are at an increased risk for later victimization or becoming violent themselves. Yet, there are also known protective factors that can help prevent violence. Stable, caring relationships from friends and family, connections to mental health and drug abuse recovery services, and the development of non-violent coping skills can all support preventing the many different forms of violence (Wilkins et al., 2014).

Violence encompasses a spectrum of physical and psychological harm. Often, we think of violence as only damaging a person's physical body, yet even threats and verbal abuse are harmful to a person's mental and emotional health. Below is a list of harmful behaviors and types of violence, but it is not an exhaustive list (Centers for Disease Control and Prevention, n.d.):

- Stalking, cyberstalking, controlling behaviors, verbal or written threats, "doxing."
- Verbal abuse, including yelling/screaming, calling names, demeaning, bullying, and cyberbullying
- Child maltreatment, including physical, sexual, and emotional abuse or neglect of a minor
- Elder maltreatment, including physical, sexual, emotional, and financial abuse of an older adult
- Physical assault, including battery, or road rage
- Sexual assault, including groping, rape, and intimate partner violence (IPV)
- Suicide and attempted suicide
- Homicide and attempted homicide
- School violence, youth gang violence, and violence related to organized crime
- Robbery and arson.

The prevalence of violent crimes varies by location and year. The Federal Bureau of Investigation (FBI) publishes information on national crime rates reported by participating law enforcement agencies each year. It should be remembered that these are only the crimes reported to law enforcement agencies (property crimes such as larceny/theft, motor vehicle theft, and burglary are not considered violent crimes under the FBI definition). The most commonly underreported crimes are sexual assault and rape - in fact, some estimates indicate that the majority (over 60%) of sexual assaults are not reported (National Sexual Violence Resource Center, n.d.).

The most recent update provided by the FBI's Uniform Crime Reporting Program at the time of this writing demonstrates a 15.2% decline in violent crime between the first quarters (January through March) of 2023 and 2024. Murder and rape declined the most by 26.4% and 25.7%, respectively, and aggravated assault decreased by 12.5% (FBI National Press Office, 2024).

Data on the prevalence of violent deaths from the CDC are slightly different, and place the homicide rate for 2022 at 7.5 per 100,000 population, for a total of 24,849 deaths that year. The CDC also reports that gun homicides accounted for 19,651 of those deaths (Centers for Disease Control and Prevention, 2024). The suicide death rate is nearly double that of homicides. According to the CDC, 49,476 people lost their lives to suicide in 2022, which is 14.8 per 100,000 population (Centers for Disease Control and Prevention, 2024).

Reference

Centers for Disease Control and Prevention. (2024). Injuries and Violence Are Leading Causes of Death. CDC. www.cdc.gov

Centers for Disease Control and Prevention. (2024). Assault or Homicide. National Center for Health Statistics/CDC. www.cdc.gov

Centers for Disease Control and Prevention. (2024). All injuries. National Center for Health Statistics/CDC. www.cdc.gov

Centers for Disease Control and Prevention. (n.d.). Violence Prevention. CDC www.cdc.gov

FBI National Press Office. (2024). FBI releases 2024 quarterly crime report and use-of-force data update. Federal Bureau of Investigation. www.fbi.gov/news

National Sexual Violence Resource Center. (n.d.). Statistics. National Sexual Violence Resource Center. www.nsvrc.org

Wilkins, N., Tsao, B., Hertz, M., Davis, R., & Klevens, J. (2014). Connecting the Dots: An overview of the links among multiple forms of violence. National Center for Injury Prevention and Control. CDC www.cdc.gov

This page titled 4.5.2.2: Violence is shared under a CC BY 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 10.3: Violence by Erin Calderone is licensed CC BY 4.0.
- 10.3.1: Gun Violence by Erin Calderone is licensed CC BY 4.0.

4.5.2.3: Drug Abuse and Addiction

Drugs can include any substance that is psychoactive or mind/mood altering. This would include nicotine, caffeine, alcohol, marijuana, and all other illicit (illegal) drugs, along with any psychoactive pharmaceutical medicines. Abuse of a substance is defined as either using an excessive amount of a recreational substance or using a prescription medication for a purpose other than it was intended for (for example, taking someone else's ADHD pills in order to stay up late and study for a test). Sometimes people develop a **substance use disorder (SUD)**, which, according to the American Psychological Association definition, is a "cluster of physiological, behavioral, and cognitive symptoms associated with the continued use of substances despite substance-related problems, distress, and/or impairment, such as impaired control and risky use" (American Psychological Association, 2026). There is likely a continuum of symptoms ranging from recreational use to bingeing to daily use, which may become an addiction. **Addiction** is differentiated from other use disorders as being in a state of dependence - psychological and often physiological dependence - on a substance (like alcohol, methamphetamines, or prescription painkillers), or a behavior (such as gambling, shopping, sex, or exercise) (American Psychological Association, 2026).

According to the 2022 National Survey on Drug Use and Health, over 168 million people, or 59.8% of the population over the age of 12, used some sort of drug in the year prior. Their survey categorized a drug as including alcohol, tobacco, vaping, and illicit drugs (including marijuana and prescription drug abuse). The majority of that use came from alcohol consumption: 48.7% (or 137.4 million people) drank alcohol, whereas only 18.1% used tobacco products, 16.5% used an illicit drug, and 8.3% vaped nicotine. Alcohol consumption becomes particularly concerning based on the dose. **Binge drinking** is defined as having 4 or more drinks for a woman or 5 or more drinks for a man on the same occasion. **Heavy alcohol use** is this type of drinking behavior on 5 or more separate occasions in the past month (SAMHSA, 2023).

The same report notes that marijuana is the most commonly used illicit drug, and in several states it has become legal for medicinal and/or recreational use, but typically only for those over the age of 21. About 22% of people over the age of 12 have used marijuana in the past year, and almost a quarter of those between the ages of 12-20 reported using it (SAMHSA, 2023). Use at young ages has been associated with declines in cognitive functioning and academic performance, as well as amplified behavioral issues. Teens who use marijuana seem to be at a higher risk of developing an addiction to marijuana or other substances later in life. Additionally, marijuana use is associated with poorer mental health: teens experiencing depression or suicidal thoughts may be more likely to use marijuana as a coping mechanism, but marijuana use also increases symptoms of depression and suicidality (Cantor, 2023). On a positive note, according to the YRBSS, the use of alcohol, marijuana, and any illicit drugs among high school students has declined since 2011 (Centers for Disease Control and Prevention, 2024).

Although presumably possessing more developed brains than their high school selves, college students are not immune to SUDs. Many college students have the perception that using stimulants will improve their academic performance, although science provides evidence to the contrary. The misuse of prescription amphetamines (a type of stimulant used to treat ADHD) is particularly common among college students, who may use them to help them study or along with other drugs like marijuana or alcohol (Butler et al., 2021).

Whether from prescription medications to treat pain, or street drugs (like heroin), opioids are particularly addictive and carry a high potential for drug overdoses due to the fact that they depress (slow down) the function of the central nervous system. According to the SAMHSA report, 8.9 million Americans misused prescription opioids, and only 991,000 misused fentanyl. This might be a significant underestimation since illegally manufactured fentanyl is often present in other drugs like heroin and cocaine without the user's knowledge (SAMHSA, 2023). In 2022, the drug overdose death rate was 32.6 per 100,000 population, an increase from 8.2 per 100,000 population just two decades prior. Although there was no significant change between 2021 and 2022, the last few years have seen an increase in drug overdoses from fentanyl and stimulants (like cocaine and methamphetamines). Drug overdose deaths affect men at over twice the rate of women (Spencer et al., 2023).

Substance use disorders (SUD) and mental illness are often co-occurring disorders. People often use alcohol or drugs to alleviate symptoms of anxiety, depression, sadness, or thoughts of suicide. About half of those living with a serious mental illness (such as major depression or bipolar disorder, among others) also had an SUD - yet only 70% of these folks with co-occurring disorders actually received treatment for it. Mental illness can lead to the desire to self-medicate or use drugs to reduce negative side effects from psychiatric medication. The link between SUD and mental illness is complex, and often treatment models and providers are separated. Additionally, nicotine dependence and tobacco use problems are commonly overlooked in mental health treatment and addiction recovery (Abrams, 2024).

Reference

American Psychological Association. (2026). Substance use, abuse, and addiction. APA www.apa.org

Abrams, Z. (2024). Psychologists help patients with serious mental illness kick nicotine and other addictions. APA www.apa.org

Butler, S. F., Faraone, S. V., Rostain, A. L., Newcorn, J. H., Antshel, K. M., Robbins, R. S., & Green, J. L. (2021). Non-medical use of prescription stimulants among college students: Non-oral routes of administration, risk factors, motivations, and pathways. Frontiers in Psychiatry, 12. doi.org/10.3389/fpsyt.2021.667118

Cantor, C. (2023). Recreational cannabis use by teens linked to risk of depression, suicidality. Columbia University Department of Psychiatry. www.columbiapsychiatry.org

Centers for Disease Control and Prevention. (2024). 2023 Youth Risk Behavior Survey results. CDC www.cdc.gov

SAMHSA. (2023). Highlights for the 2022 National Survey on Drug Use and Health. Center for Behavioral Health Statistics and Quality. www.samhsa.gov

Spencer, M., Garnett, M., & Miniño, A. (2023). Drug overdose deaths in the United States, 2002-2022. National Center for Health Statistics (U.S.). dx.doi.org/10.15620/cdc:135849

This page titled 4.5.2.3: Drug Abuse and Addiction is shared under a CC BY 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 10.5: Drug Abuse, Addiction, and Co-Occurring Disorders by Erin Calderone is licensed CC BY 4.0.

4.5.2.4: Tobacco Use

Probably one of the most recognizable public health movements has been the fight against tobacco use. Since the first Surgeon General's report on the harmful effects of smoking in 1964, the public perception and acceptance of smoking has strongly soured. In 2024, approximately 10.1% of adults in the United States (aged 18 and older) were estimated to be current cigarette smokers and the trend has been on a downward trend over time: estimated 42% of Americans who smoked in 1965 and 25.3% in 1990 (National Center for Health Statistics, n.d.; Centers for Disease Control and Prevention, 2024).

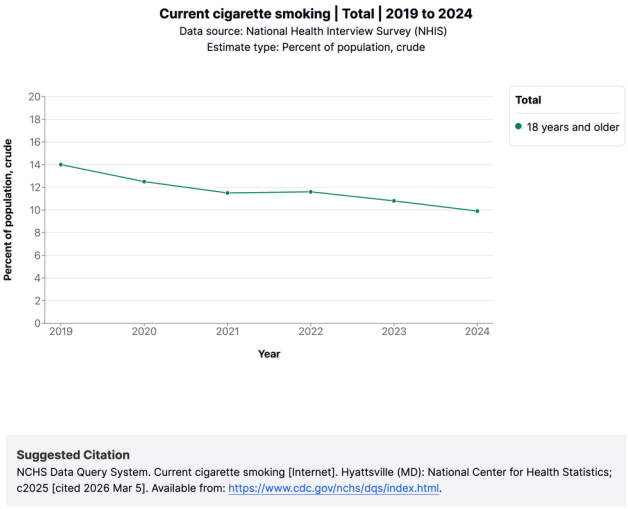


Figure 4.5.2.4.1: This line graph shows a steady overall decline in smoking prevalence, starting at approximately 14% in 2019 and falling to just under 10% by 2024. While a slight plateau is visible between 2021 and 2022, the subsequent years maintain a downward trajectory. This visual evidence highlights the ongoing shift in public health behaviors and the decreasing percentage of the adult population that identifies as current cigarette smokers (Public Domain; CDC)

For teens, there has been a significant decline in cigarette smoking since the 1990s - in 1997, 24.6% of high school seniors reported smoking daily (Pampel & Aguilar, 2007), whereas in 2023 current use was at about 10% for middle and high. Among those kids who currently smoke, e-cigarettes are the most common product used. Smoking during the teen years is particularly concerning due to the addictive nature of nicotine. Nearly 90% of adult smokers began smoking before age 18. Despite a decline in high school tobacco use, further progress depends on sustained surveillance and the continued application of evidence-based strategies, ranging from media campaigns to robust regulatory oversight (Birdsey et al., 2023).

Who are these holdout smokers? Men tend to smoke more than women, while smoking rates are lowest for Asian and Hispanic groups compared to non-Hispanic White and non-Hispanic Black populations. Perhaps most telling is the correlation of tobacco use and education or income levels. The highest smoking rates are found for folks with a GED (30.7%) or no high school diploma (20.1%), and progressively decline with higher educational attainment - only 3.2% of those with a graduate degree smoke. Similarly, smoking rates decline along lines of income, with the highest rates for low income (18.3%) versus middle income (12.3%) and high income (6.7%) (Centers for Disease Control and Prevention, 2024). Perhaps there are factors associated with socioeconomic status and education level that influence a person's likelihood of smoking and the ease with which they can quit. Stress, social norms, and access to smoking cessation support are all influenced by these other social determinants.

The burden of tobacco products on society cannot be overstated. Smoking is the leading preventable cause of death, and is considered responsible for over 480,000 deaths each year. Smoking increases the risk of cardiovascular disease, stroke, diabetes, cancers (particularly lung cancer - but also others), asthma, chronic obstructive pulmonary disease (COPD), and more. In 2018, it is estimated that smoking cost the U.S. over $600 billion, including both healthcare costs and lost productivity (Centers for Disease Control and Prevention, 2024). Yet, the tobacco industry still spends billions of dollars to advertise its products. Targeted marketing is often aimed at women and specific racial/ethnic communities. And in spite of decades of restrictive legislation on this advertising to protect children, these advertisements still have an effect on youth perceptions of smoking

(Centers for Disease Control and Prevention, 2021).

Reference

Birdsey J, Cornelius M, Jamal A, et al. Tobacco Product Use Among U.S. Middle and High School Students — National Youth Tobacco Survey, 2023. MMWR Morb Mortal Wkly Rep 2023;72:1173–1182. dx.doi.org/10.15585/mmwr.mm7244a1.

Centers for Disease Control and Prevention. (2021). Tobacco industry marketing. CDC. www.cdc.gov

Centers for Disease Control and Prevention. (2024). Current cigarette smoking among adults in the United States. Burden of cigarette use in the U.S. CDC www.cdc.gov

Centers for Disease Control and Prevention. (2024) Tobacco Disparities Dashboard. Office on Smoking and Health. U.S. Department of Health and Human Services. CDC www.cdc.gov

National Center for Health Statistics. (2021). NCHS Data Query System/Current cigarette smoking|total|2019 to 2024. CDC nchsdata.cdc.gov

Pampel, F. C., & Aguilar, J. (2007). Changes in youth smoking, 1976–2002. Youth & Society, 39(4), 453–479. doi.org/10.1177/0044118x07308070

This page titled 4.5.2.4: Tobacco Use is shared under a CC BY 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 10.6: Tobacco Use by Erin Calderone is licensed CC BY 4.0.

4.5.2.5: Nutrition

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 (U.S. Department of Agriculture, 2026). 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 visualize 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, 2025). The most recent guidelines also emphasize ethnic and cultural variations in dietary patterns and how to incorporate them in enjoyable, affordable ways (U.S. Department of Agriculture, 2026).

Researchers and epidemiologists use a scoring system to compare Americans' current eating habits with dietary guidelines. This score is called the Healthy Eating Index (HEI) and reflects diet quality, not quantity (or the number of calories consumed). Between 2005-2006 and 2015-2016, HEI scores from NHANES data have reflected persistent patterns below the dietary guidelines for quality (U.S. Department of Agriculture, 2025). In terms of quantity, we are certainly eating more. United Nations publications indicate that total calorie consumption has increased worldwide over the past two decades, rising 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 per capita consumption in the 1970s was just over 2,000 kcal. Although dietary fads come and go, Americans are certainly consuming more grains and fats than they used to (DeSilver, 2016), and sugar-sweetened beverage consumption is up in the U.S. and worldwide (Lara-Castor et al., 2023).

Reference

DeSilver, D. (2016). What’s on your table? How America’s diet has changed over the decades. Pew Research Center. www.pewresearch.org

Lara-Castor, L., Micha, R., Cudhea, F., Miller, V., Shi, P., Zhang, J., Sharib, J. R., Erndt-Marino, J., Cash, S. B., Mozaffarian, D., Bas, M., Ali, J. H., Abumweis, S., Krishnan, A., Misra, P., Hwalla, N. C., Janakiram, C., Liputo, N. I., Musaiger, A., Hakeem, R. (2023). Sugar-sweetened beverage intakes among adults between 1990 and 2018 in 185 countries. Nature Communications, 14(1). doi.org/10.1038/s41467-023-41269-8

Raikar, S. P. (2025). Food pyramid. Encyclopedia Britannica. www.britannica.com

United Nations News. (2022). Once again, US and Europe way ahead on daily calorie intake. UN News. news.un.org

U.S. Department of Agriculture. (2025). Healthy Eating Index. U.S. Department of Agriculture/Food and Nutrition Service, Center for Nutrition Policy and Promotion. www.fns.usda.gov

U.S. Department of Agriculture. (2026). Dietary Guidelines for Americans, 2025-2030. 10th Edition. www.dietaryguidelines.gov/

This page titled 4.5.2.5: Nutrition is shared under a CC BY 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 10.8: Nutrition by Erin Calderone is licensed CC BY 4.0.

4.5.2.6: Physical Activity and Fitness

Both maintaining consistent physical activity and having a high level of physical fitness are protective against chronic diseases, which are the primary causes of death.

- **Physical activity** refers to the total amount of movement you get throughout the day.
- **Fitness** refers to the conditioning of your body: the capacity of your heart, lungs, and muscles to perform high-intensity work.

These two concepts are closely intertwined: a minimum level of fitness is required to be physically active, and those with high fitness tend to engage in more physical activity. Yet what is interesting is that each is independently protective against cardiovascular disease, diabetes, and some cancers - regardless of body weight, age, or sex (which are usually also risk factors). In other words, being active and fit is important for health in everybody (Foreman, 2020).

The CDC recommends that adults get at least 150 minutes of moderate physical activity or 75 minutes of vigorous physical activity (or a 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, with at least 3 days per week of muscle- and bone-strengthening exercises (U.S. Department of Health and Human Services, 2018). There isn't anything magical that happens between ages 17 and 18 that immediately reduces the need for physical activity, shifting recommendations from those for children and teens to those for 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 a concern for avid endurance athletes, or when a sedentary person suddenly and drastically increases their physical activity (Foreman, 2020).

Most Americans certainly do not get enough physical activity. In 2018, only 54% of adults reported meeting the CDC-recommended minimum of minutes of physical activity per week; only 27.6% performed muscle-strengthening exercises on at least 2 days per week; and only 24% met both. According to data from the Behavioral Risk Factor Surveillance System (BRFSS) for 2017-2020, more than 25% of adults reported no physical activity outside of work (Centers for Disease Control and Prevention, 2025). Adolescence is a time when 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 worldwide do not get enough physical activity, and in high-income countries like the U.S., these trends 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 assess aerobic (endurance) capacity. There are other measures of fitness, including muscular strength, endurance, flexibility, and balance - all of which have also been shown to have protective health benefits. The majority of research over the last several decades, however, has focused on CRF and its inverse association with chronic diseases, particularly cardiovascular disease risk factors. 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 reduces the risk of all-cause mortality, regardless of weight status. So, for folks with excess body fat, those with moderate to high fitness levels 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. While some studies have been able to collect accurate measurements in large groups of people, the less fit are often excluded from these measurements because performing a validated CRF treadmill test on them is too risky. Thus, several studies that attempt to measure CRF cross-sectionally tend to recruit people who are already physically active or fit, and their subjects are 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 in other demographic groups (Wang et al., 2010).

Physical activity offers benefits beyond chronic disease prevention, including support for 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 (Wang & Peiper, 2022). Physical activity can support quality, efficient sleep, which also supports mental and emotional health. When it comes to brain gains, most evidence for the acute and long-term cognitive benefits of physical activity has been found in children, yet there is growing evidence of an association between CRF and academic achievement in young adulthood (Åberg et al., 2009). Lifelong physical activity is certainly protective against dementia and improves 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 physical activity (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 2022 follow-up suggested that the COVID-19 pandemic didn't significantly change the time people spent sedentary. 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 attend remote schooling tended to reduce their physical activity during that period (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 adults who meet the recommended minimum physical activity may not be able to undo all the health hazards of sitting for the rest of the day. According to a meta-analysis of sedentary studies and all-cause mortality risk, about 60-75 minutes of hard exercise can offset the risks of sitting for more than 8 hours per day (Ekelund et al., 2016). In other words, people not only need to move more for their health but also sit less.

Reference

Åberg, M. A. I., Pedersen, N. L., Torén, K., Svartengren, M., Bäckstrand, B., Johnsson, T., Cooper-Kuhn, C. M., Åberg, N. D., Nilsson, M., & Kuhn, H. G. (2009). Cardiovascular fitness is associated with cognition in young adulthood. Proceedings of the National Academy of Sciences, 106(49), 20906–20911. doi.org/10.1073/pnas.0905307106

Centers for Disease Control and Prevention. (2025). Adult physical inactivity outside of work. CDC www.cdc.gov

Ekelund, U., Steene-Johannessen, J., Brown, W. J., Fagerland, M. W., Owen, N., Powell, K. E., Bauman, A., & Lee, I.-M. (2016). Does physical activity attenuate, or even eliminate, the detrimental association of sitting time with mortality? A harmonised meta-analysis of data from more than 1 million men and women. The Lancet, 388(10051), 1302–1310. doi.org/10.1016/s0140-6736(16)30370-1

Foreman, J. (2020). Exercise is medicine: How physical activity boosts health and slows aging. Oxford University Press, USA.

Gaesser, G. A., & Angadi, S. S. (2021). Obesity treatment: Weight loss versus increasing fitness and physical activity for reducing health risks. iScience, 24(10), 102995. doi.org/10.1016/j.isci.2021.102995

Matthews, C. E., Carlson, S. A., Saint-Maurice, P. F., Patel, S., Salerno, E. A., Loftfield, E., Troiano, R. P., Fulton, J. E., Sampson, J. N., Tribby, C., Keadle, S. K., & Berrigan, D. (2021). Sedentary behavior in U.S. adults: Fall 2019. Medicine & Science in Sports & Exercise, 53(12), 2512–2519. doi.org/10.1249/mss.0000000000002751

US Department of Health and Human Services. (2018). Physical Activity Guidelines for Americans. 2nd edition. US Department of Health and Human Services/ Office of Disease Prevention and Health Promotion www.odphp.health.gov

Van Sluijs, E. M. F., Ekelund, U., Crochemore-Silva, I., Guthold, R., Ha, A., Lubans, D., Oyeyemi, A. L., Ding, D., & Katzmarzyk, P. T. (2021). Physical activity behaviours in adolescence: Current evidence and opportunities for intervention. The Lancet, 398(10298), 429–442. doi.org/10.1016/s0140-6736(21)01259-9

Wang, C. H., & Peiper, N. (2022). Association between physical activity and sedentary behavior with depressive symptoms among US high school students, 2019. Preventing Chronic Disease, 19. doi.org/10.5888/pcd19.220003

Wang, C.-Y., Haskell, W. L., Farrell, S. W., LaMonte, M. J., Blair, S. N., Curtin, L. R., Hughes, J. P., & Burt, V. L. (2010). Cardiorespiratory fitness levels among US adults 20-49 years of age: Findings from the 1999-2004 National Health and Nutrition Examination

Survey. American Journal of Epidemiology, 171(4), 426–435. doi.org/10.1093/aje/kwp412

This page titled 4.5.2.6: Physical Activity and Fitness is shared under a CC BY 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 10.9: Physical Activity and Fitness by Erin Calderone is licensed CC BY 4.0.

4.5.2.7: Obesity

The obesity epidemic is probably the 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 puts more stress on joints, making them 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 (National Institute of Diabetes and Digestive and Kidney Diseases, n.d.). Of particular concern is visceral, or central, adiposity, the fat that accumulates around the internal organs in the abdomen, which 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 risk for cardio-metabolic diseases like diabetes, hypertension, and cardiovascular disease (Juppi et al., 2022).

It would be optimal to estimate body fat accurately using tools such as a dual-energy X-ray absorptiometry (DEXA) scan or a bioelectrical impedance analyzer (BIA), but these are often costly. The DEXA requires trained personnel to operate, and BIA results can be influenced by other physiological factors (such as 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%) in large populations. Instead, epidemiologists have long used a controversial calculation of weight-to-height ratio, called body mass index (BMI). There are several reasons BMI is considered less accurate than BF%, one of which is that BMI tends to be higher in individuals with greater muscle mass or bone density, and there may be genetic variation in body density that BMI does not account for. 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 from self-reported weight and height, and large epidemiological surveys still employ this measure to indicate population-level health-related weight status.

> BMI is calculated using either of the equations below:
>
> $BMI = \text{weight (kg)} / \text{height (m)}^2$
>
> or
>
> $BMI = \text{weight (lbs)} / [\text{height (in)}]^2 \times 70$

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% by 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, and severe obesity costs 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 with a high school diploma and some college had the highest obesity rate (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 (Centers for Disease Control and Prevention, 2024). 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. In 2024, 35 million children under 5 years old were overweight. 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, 2025).

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 (environments that tend to cause obesity). Having obesity may limit economic success via weight stigma in the workplace, while conversely, living in a wealthier neighborhood with plenty of green space 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).

Reference

Anekwe, C. V., Jarrell, A. R., Townsend, M. J., Gaudier, G. I., Hiserodt, J. M., & Stanford, F. C. (2020). Socioeconomics of Obesity. Current Obesity Reports, 9(3), 272–279. doi.org/10.1007/s13679-020-00398-7

Centers for Disease Control and Prevention. (2024). Adult obesity facts. CDC www.cdc.gov

Foreman, J. (2020). Exercise is medicine: How physical activity boosts health and slows aging. Oxford University Press, USA.

Juppi, H., Sipilä, S., Fachada, V., Hyvärinen, M., Cronin, N., Aukee, P., Karppinen, J. E., Selänne, H., Kujala, U. M., Kovanen, V., Karvinen, S., & Laakkonen, E. K. (2022). Total and regional body adiposity increases during menopause—evidence from a follow-up study. Aging Cell, 21(6). doi.org/10.1111/acel.13621

Li, Z., Daniel, S., Fujioka, K., & Umashanker, D. (2023). Obesity among Asian American people in the United States: A review. Obesity, 31(2), 316–328. doi.org/10.1002/oby.23639

National Institute of Diabetes and Digestive and Kidney Diseases. (n.d.). Health risks of overweight & obesity. NIDDK www.niddk.nih.gov

Ward, Z. J., Bleich, S. N., Cradock, A. L., Barrett, J. L., Giles, C. M., Flax, C., Long, M. W., & Gortmaker, S. L. (2019). Projected U.S. state-level prevalence of adult obesity and severe obesity. *New England Journal of Medicine*, *381*(25), 2440–2450. doi.org/10.1056/nejmsa1909301

World Health Organization. (2025). Obesity and overweight. World Health Organization: WHO. www.who

This page titled 4.5.2.7: Obesity is shared under a CC BY 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 10.7: Obesity by Erin Calderone is licensed CC BY 4.0.

4.5.2.8: Mental Health

Mental health is a broad category that covers over 200 potential illnesses of varying severity. The mental health spectrum includes emotional, psychological, and social well-being. Mental health is influenced by genetics, biological factors like diseases or injuries, neurochemistry (chemical messengers in the brain), as well as environmental factors such as stress, adverse childhood experiences (like abuse, neglect, etc.), trauma, isolation and loneliness, and the use of drugs and alcohol. Life changes significantly impact mental health - particularly significant changes such as the death of a loved one, the end of a relationship, the birth of a child, a change in living situation, and physiological changes that occur across the lifespan, such as maturation and aging. When certain symptoms of psychological distress or problematic thinking are severe or long-lasting, they may be diagnosed as a mental illness.

The CDC reports that over 20% of U.S. adults currently live with a mental illness, and over 20% of youth between the ages of 13-18 have experienced a debilitating mental health issue. The most serious mental illnesses include bipolar disorder, schizophrenia, and major depression, affecting about 1 in 25 adults (Centers for Disease Control and Prevention, 2025).

Mental illnesses or mental disorders cannot be diagnosed with blood tests or X-rays. Instead, these disorders are diagnosed by a cluster of symptoms - usually by a licensed psychologist or psychiatrist (the difference being that only psychiatrists provide any prescriptions for psychiatric medications). As research continues to expand our knowledge of mental health disorders, these diagnoses are updated into a manual used by mental health professionals. The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision (DSM-5-TR) is the most recent edition, published by the American Psychiatric Association. This manual includes symptoms and diagnoses for various psychological disorders.

Mental disorders can occur together, and the interpretation of symptoms (and therefore diagnosis) is complicated. Accurate diagnosis and treatment are also dependent on the cultural competency of the provider to differentiate between behavioral differences that are due to socio-cultural factors vs. those caused by a mental disorder (Seabert et al., 2021). Historically, the DSM has been revised to incorporate emerging evidence-based diagnostic criteria and to reflect the evolving understanding of socio-cultural influences on the interpretation of mental health. For example, up until the 1980s (when it was removed), homosexuality - or a reference to “sexual orientation disturbance” - was present in the DSM. And prior to the 1980s, PTSD, bipolar disorder, and acute stress disorders were not included. In the DSM-5, the term “hysteria” was replaced with “somatic symptom disorder”, and Asperger’s was removed as an independent diagnosis and instead included within the Autism spectrum (Surís et al., 2016). Further advances in the medical understanding of mental health and diagnostic procedures for psychiatric disorders will likely prompt continued evolution of this manual, as well as psychiatric and psychological practices.

Even for those without a diagnosed mental illness, mental and emotional health are highly influenced by stress. Each year, the American Psychological Association (APA) conducts a survey on Stress in America to get a snapshot of the amount of stress Americans are experiencing and the most common stressors (sources of stress). The data for 2023 indicate increased stress in America due to recovery from the COVID-19 pandemic, as well as global conflict, inflation, racism and racial injustice, and climate disasters (such as drought, wildfires, floods, and severe storms). Collective traumatic stress from the pandemic may be impacting the psychological and physical health of individuals and communities in the U.S., where COVID-19 has claimed the lives of over 1 million people, caused huge job losses and economic impacts, and strained social cohesion. According to this latest analysis, self-reported mental illness diagnoses have increased from 32% of adults in 2019 to 37% of adults in 2023 (though 81% of those surveyed reported their own mental health as good or better). Those reporting a stress level of 8/10 or higher rose from 19% in 2019 to 24% in 2023. The increase was especially pronounced for those aged 35-44 (American Psychological Association, 2023).

As of 2026, the United States is navigating high levels of stress and collective trauma through a shift toward nervous system regulation, community-led resilience networks, and the normalization of trauma-informed care. There is a growing trend toward "emotional fluency," in which individuals—particularly younger generations—are more likely to proactively seek care and to vocalize their struggles (American Psychiatry Association, 2026).

Mental health issues are particularly concerning for adolescents. Over half of all mental illness cases will start showing symptoms by age 14, and 75% of them develop symptoms before 24 (Centers for Disease Control and Prevention, 2025). The top 3 leading causes of death for adolescents are unintentional injuries (accidents), homicides, and suicides (Elflein, 2024), all of which may have poor mental health as a factor. Young people with poor mental health are also more likely to engage in risky behaviors such as unprotected sex and drug use. The Youth Risk Behavior Surveillance Survey in 2021 reported that persistent feelings of sadness and hopelessness (symptoms of depression) affected 42% of high school students, and this rate was significantly higher for female students and LGBTQ+ youth. Overall, rates of poor mental health for high schoolers have increased since 2011 (Centers

for Disease Control and Prevention, 2024).

College students are also struggling with increasing rates of mental health issues, particularly during the recovery from the COVID-19 pandemic. According to one study, in 2020-2021, over 60% of college students met the criteria for a mental health disorder - a 50% increase from 2013 (Lipson et al., 2022). High levels of stress are often reported by college students, as well as depression, anxiety, panic attacks, and substance abuse problems. In fact, college may be where many students first begin experiencing symptoms of mental disorders, and/or begin using stimulants or prescription substances to get high or help with studying. Having a supportive network of family and friends, as well as access to mental health services on campus, may help students find balance and reduce the risk of early dropout. Common barriers to getting help include social stigma of seeking help for mental health, as well as cost and access to counselors (Johnson et al., 2023).

Reference

American Psychiatric Association. (2026). More Americans plan mental health resolutions heading into 2026. APA www.psychiatry.org

American Psychological Association. (2023). Stress in America 2023: A nation recovering from collective trauma. APA www.apa.org

Centers for Disease Control and Prevention. (2025). About mental health. CDC www.cdc.gov

Centers for Disease Control and Prevention. (2024). 2023 Youth Risk Behavior Survey results. CDC www.cdc.gov/yrbs/results/2023

Elflein, J. (2024). Top 10 causes of death among teens aged 15 to 19 years U.S. 2021. Statista. www.statista.com

Johnson, R. L., Nandan, M., Culp, B., & Thomas, D. (2023). College students' mental health help-seeking behaviors. College Student Affairs Journal, 41(1), 73–89. doi.org/10.1353/csj.2023.0005

Lipson, S. K., Zhou, S., Abelson, S., Heinze, J., Jirsa, M., Morigney, J., Patterson, A., Singh, M., & Eisenberg, D. (2022). Trends in college student mental health and help-seeking by race/ethnicity: Findings from the national healthy minds study, 2013–2021. Journal of Affective Disorders, 306, 138–147. doi.org/10.1016/j.jad.2022.03.038

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

Surís, A., Holliday, R., & North, C. (2016). The evolution of the classification of psychiatric disorders. Behavioral Sciences, 6(1), 5. doi.org/10.3390/bs6010005

This page titled 4.5.2.8: Mental Health is shared under a CC BY 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 10.4: Mental Health by Erin Calderone is licensed CC BY 4.0.

5: HEALTH LAW POLICY AND ETHICS

Health law and policy are the tools society uses to influence behavior. These laws and policies encourage or discourage certain actions by individuals, groups, or the entire population, and apply to public health centers and health care organizations (which will be covered in another chapter).

Health practitioners tend to be acquainted with the four principles of ethical evaluation: beneficence, nonmaleficence, respect for persons (autonomy), and justice in their interactions with patients. (U.S. National Commission for the Protection of Human Subjects of Biomedical and Behavioural Research, 1978; Beauchamp and Childress, 2012). These principles apply to health and research and are also relevant to public health.

Bioethics arose in response to advances in biomedicine and biotechnology, medical paternalism, and the abuse of human subjects in medical research. Bioethics has championed informed consent, patient autonomy in doctor-patient relationships, and the safety of human subjects in research.

In the following pages, we will be covering how these topics relate to public health.

5.1: Bioethics

5.2: Police Power

5.3: Health Policy

5.4: Types of Law

5.5: Pandemic Response

Reference:

Beauchamp, T.L., and J.F. Childress. 2012. Principles of biomedical ethics, 7th ed. New York: Oxford University Press.

National Commission for the Protection of Human Subjects of Biomedical and Behavioural Research. 1978. Belmont Report: Ethical principles and guidelines for the protection of human subjects of research. US Department of Health and Human Services. NIH www.hhs.gov

This page titled 5: Health Law Policy and Ethics is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

5.1: Bioethics

Bioethics encompasses elements of health care and public health, and its primary goal is to apply moral and ethical principles to areas of controversy or conflict. It is the field that bridges health law and policy, aiming to draw on our shared values and morals to address contentious subjects such as novel technologies, stem cell research, and end-of-life care. (Riegelman & Kirkwood, 2025 p. 104). In general, bioethics examines the ethical, social, and legal questions that emerge in biomedicine and biomedical research, and it can be further divided into medical ethics, environmental ethics, and public health ethics (National Institute of Environmental Health Sciences, 2024).

An analysis of the origins of bioethics shows that it grew from efforts to protect research participants while ensuring society would benefit from the results of such research. An analysis of history shows it was born from:

- The Nuremberg trials of German physicians, who performed experiments on Jewish prisoners in Nazi concentration camps, established internationally accepted principles, known as the **Nuremberg Code**, which provide directives for human experimentation (The Office of Research and Integrity, n.d).
- The **Tuskegee Syphilis Study** was a study that took place in the United States from 1932 to 1972 and aimed to use disadvantaged black men in the south to study the course of syphilis under the pretence that they were receiving effective treatment. The participants were provided with deceptive information to retain them in the study (Centers for Disease Control and Prevention, 2024).

Research on Human Subjects

The infamous Tuskegee Study led to a change in the standard of then-current research practice. In 1974, the National Research Act was signed into law, creating the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. The Commission established guidelines and regulations for human-subjects research, and in 1979, it codified these principles in the **Belmont Report**. The Belmont Report is based on the values of justice, beneficence, and respect, and, on these bases, it introduced the principles of **informed consent** and the **Institutional Review Board (IRB).** Any form of human research nowadays requires the study participant to sign informed consent, which they voluntarily provide after receiving all necessary information and understanding the potential risks, benefits, and alternatives of their participation. Study participants also have the right to withdraw from the research at any time and for any reason. The Institutional Review Board (IRB) is an independent committee responsible for reviewing and approving research involving human participants to ensure the protection of their rights, welfare, and safety. The purpose of the Institutional Review Board is to uphold ethical principles in human subjects research, ensuring dignity, beneficence, and justice (Centers for Disease Control and Prevention, 2024).

Current Bioethics Issues

Historically, many improvements in the treatment of humans in research have occurred. However, in the age of technological advances, another obstacle is emerging. Let's examine one topic in bioethics, human genetic modification. In 2018, a Chinese scientist reported successful modification of a gene in human embryos in an attempt to prevent HIV infection (the father was infected with HIV and the mother was not). The report was met with disapproval from scientists and ethicists, who condemned the experiment as unethical and unsafe. The fear was that this would open the doors to rogue attempts to create permanent genetic changes using unproven and unregulated methods. Although we may think this is an international issue, it affects how scientists conduct research worldwide. In this particular case, the Chinese researcher was a postdoctoral student in the lab at Stanford University. He, the postdoctoral researcher, discussed the experiment and received instructions from the lead researcher at Stanford University, whose laboratory he was working in. Even though the lead researcher warned that potential bioethical boundaries might be crossed, the postdoctoral researcher proceeded with the research upon returning to his native country, China.

When the postdoctoral researcher published his findings, the scientific community outcry in disapproval; the criticism was that the scientists had violated ethics and research integrity, and "experts agree there are safer and more effective ways to prevent HIV infections, and the experiment was premature, irresponsible, and unjustified because it exposed the babies to risk associated with gene editing for little, if any, benefit" (Normile, 2019).

Investigations were conducted by Stanford University, the Chinese government, and the Chinese University, SUSTech (Belluck,

2019). The Stanford University researcher was cleared of any wrongdoing; however, the Chinese scientist and his helpers were found guilty. The main Chinese scientist was sentenced to 3 years in jail and fined ($429,000), and the other two scientists were also sentenced, but to a lesser amount of jail time and a fine (Normile, 2019).

Many questions about the ethics of research remain unanswered. In today's technology, gene modification is possible, but should we? What implications does it bring forth? Who benefits from it? What is the harm? Should it be allowed for some diseases (such as Huntington's Disease), but not for other purposes (such as to increase a child's IQ or beauty)? Could the implication of it make the gap between those who have and those who have not bigger or smaller? If one nation approves such research and another does not, will there be long-term disadvantages? Do we need to have regulations in place, and if so, by whom?

Reference

Belluck, P. (2019). Stanford clears professor of helping with gene-edited babies experiment. The New York Times. www.nytimes.com

Centers for Disease Control and Prevention. (2024). About the untreated syphilis study at Tuskegee. CDC www.cdc.gov

Centers for Disease Control and Prevention. (2024). Effects on Research. CDC www.cdc.gov

The Office of Research and Integrity. (n.d.). Nuremberg Code: Directives for human experimentation. US Department of Health & Human Services www.ori.hhs.gov

National Institute of Environmental Health Sciences (2024). Bioethics. NIH www.niehs.nih.gov

Normile, D. (2019). Chinese Scientist who produced genetically altered babies sentenced to 3 years in jail. Science doi: 10.1126/science.aba7347

Rielgeman, R., & Kirkman, B. (2025). Public health 101 Improving community health (4th ed). Jones & Bartlett Learning, LLC.

This page titled 5.1: Bioethics is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by LibreTexts.

5.2: Police Power

The United States was born of the Declaration of Independence on July 4, 1776, which established the foundational ideals of liberty, equality, and fundamental human rights. It is the Constitution that puts these ideals into practice. The Constitution, signed in 1787, is the supreme law of the United States; it provides the framework of government, defines citizens' rights, and outlines the principles that have shaped the nation's development. The first ten amendments of the United States Constitution are known as the Bill of Rights.

The Tenth Amendment of the Constitution governs the issues concerning public health and healthcare. However, because the Tenth Amendment does not explicitly mention "health", the specific issues that arise within these facets are left for the states to solve. This allows the states to pass legislation intended to protect the common good of their citizens; this power is called **Police Power.** In essence, the state police power ensures each state can protect its own public health and safety by setting and enforcing its own standards (Riegelman & Kirkwood, 2025 p105).

State police power is the state's ability to control, regulate, or prohibit non-criminal behavior (Galva, Atchison, & Levey, 2005). This is why healthcare credentials from one state are not automatically valid in another; beyond healthcare licensing, states use police power to protect the general welfare and public health. Public health police power can provoke controversy when it appears to infringe on individual rights. Individuals in the United States have fundamental rights that prohibit the states from depriving any person of life, liberty, or due process of the law. These rights are provided under the Due Process Clauses of the Fifth and Fourteenth Amendments. The Due Process Clauses are the **substantive due process,** which protects fundamental individual rights (a person's life, liberty, or property) from government interference, and **procedural due process**, which is the procedures the government must take before it deprives an individual of their fundamental rights (Chapman & Yoshino, 2025).

Public Health Police Power vs Individual Rights

Police power is reserved to the states, with the limitation being the **Constitution's Supremacy Clause;** in public health, the limitation comes via interstate and international commerce under the **Interstate Commerce Clause**. The Interstate Commerce Clause is a provision in the U.S. Constitution (Article I, Section 8, Clause 3) that grants Congress the power to regulate commerce with foreign nations, among the states, and with Indian tribes (Constitution Annotated, n.d.). The two clauses are connected and allow Congress to exercise its power to regulate interstate commerce, and any state laws that impede or conflict with those federal regulations are rendered void by the Supremacy Clause. It is important to note that the Interstate Commerce Clause authorizes Congress to enact public health measures by regulating activities that substantially affect interstate commerce, such as disease prevention and quarantine. It serves as a source of federal regulatory authority over economic activity and helps prevent states from erecting protectionist trade barriers, thereby ensuring a national market for goods and services.

The Constitution's Supremacy Clause establishes that federal law is superior to conflicting state laws in matters delegated to the federal government. This principle also extends to protecting individual rights. This allows states to enforce civil-protection rules. State public health police power gives states the authority to create and enforce laws such as isolation, quarantine, and health inspections to stop or slow the spread of disease. States' authority to use their police powers has been limited by the balance of power among individuals, states, and the federal government. Historically, courts have ruled that, to avoid constitutional limitations, states must prove that their public health measures are genuinely intended to promote public health and the "common good" (Galva, Atchison, & Levey, 2005).

Historically, states could enforce quarantines with the full backing of the courts. One well-known example goes back to the 18th century in New York. An Irish-born American, Mary Mallon, today known as Typhoid Mary, infected between 51 and 122 people with typhoid fever and was the cause of some deaths. She was later diagnosed as an asymptomatic carrier of the bacterium that causes typhoid fever, *Salmonella typhi*. When identified as the source of the outbreak, she was asked not to work as a cook because of her carrier status. She was forcibly quarantined twice by the state of New York authorities. Because of her insistence on working as a cook and by doing so exposing others to typhoid, the second time the quarantine lasted the remainder of her life. She died from pneumonia after 30 years in quarantine at age 69. Records show that she attempted to sue the New York Health Department, but the New York Supreme Court dismissed the case (Wikipedia, 2025).

In more recent times, the COVID-19 pandemic brought a major shift in the relationship between individual rights and public health. The response demonstrated a tension between the state's police power—its inherent authority to regulate for the health, safety, and general welfare of its citizens—and individual rights guaranteed by law. This was most evident in the

implementation of public health measures that restricted civil liberties in the name of curbing the virus's spread. Individual freedoms such as freedom of assembly (e.g., businesses, schools, and places of worship), movement (e.g., stay-at-home orders and travel restrictions), economic liberty (e.g., non-essential business closures), and bodily autonomy (e.g., vaccine and mask mandates). The scale and duration of these restrictions during the pandemic were unprecedented. This has led to an ongoing re-evaluation of where the line should be drawn (Flood et al. 2020).

In response to the pandemic, states and local governments leaned heavily on their police power to justify these measures, framing them as necessary for the common good. The dispute between state public health police power and individual rights led to many lawsuits, and the Supreme Court's response eventually was to constrain government power. It is noted that courts often applied heightened scrutiny to restrictions that affected fundamental rights, particularly religious freedom, and questioned whether the government's actions were the least restrictive means of achieving its public health goals. One example of this was Tandon v. Newsom (2021), in which the Court struck down California's ban on in-home religious gatherings, even as it permitted other non-religious indoor activities. The Court reasoned that once the government permits certain activities, it can't impose a blanket ban on similar activities, such as religious gatherings, without a compelling reason (Vile, 2025).

The pandemic highlighted a long-standing tension: the balance between individual rights and collective well-being. While a majority of people were willing to sacrifice some personal freedoms for public health, this willingness often decreased over time as people's concerns about the virus waned (Yang et al., 2020). The following are some questions that remain unsolved (Flood et al. 2020):

- When a public health emergency is no longer at its peak, what is the process for rolling back restrictive measures?
- What legal precedents have been set, and how will they affect future public health crises?
- How can governments use their police powers to protect public health without unfairly burdening certain groups or infringing on fundamental rights?

Reference

Chapman, N. & Yoshino, K. (2025). Common interpretation. National Constitution Center www.constitutioncenter.org

Constitution Annotated. (n.d.). Article I, Section 8, Clause 3. Congress.gov www.constitution.congress.gov

Flood, C., MacDonnell, V., Thomas, B., & Wilson, K. (2020). Reconciling civil liberties and public health in the response to COVID-19. FACETS doi.org/10.1139/facets-2020-0070

Galva, J. E., Atchison, C., & Levey, S. (2005). Public health strategy and the police powers of the state. Public Health Reports 120:20–27. doi: 10.1177/00333549051200S106

Rielgelman, R. & Kirkwood, B. (2025). Public Health 101: Improving community health (4th ed). Jones & Bartlett Learning, Inc.

Savulescu J.(2023). Ethics of Selective Restriction of Liberty in a Pandemic. In: Savulescu J, Wilkinson D, editors. Pandemic Ethics: From COVID-19 to Disease X. Oxford (UK): Oxford University Press www.ncbi.nlm.nih.gov

Shapiro, I. (2020). State police powers and the Constitution. Cato Institution www.cato.org

Vile, J. R.(2025). Tandon v. Newsom (2021). Free Speech Center at Middle Tennessee State University www.firstamendment.mtsu.edu

Wikipedia. (2025). Mary Mallon. Wikipedia en.wikipedia.org

Yang, D. Y., Stantcheva, S., Menjeong, J. K., Eichmeyer, S. Braghieri, L., & Alsan, M. (2020). Civil liberties during the COVID-19 pandemic. Centre for Economic Policy and Research www.cepr.org

This page titled 5.2: Police Power is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by LibreTexts.

5.3: Health Policy

Policymaking is an important part of public health. Typically, we think of policies as laws, regulations, or funding requirements created and enforced by governments. In the U.S., public health is governed at the local, state, and national levels. The interplay between different bureaucracies - at times cooperative and at others in opposition with each other - can actually have just as much of an impact on health policies as the politicians (and interest groups) who propose them (Shi & Singh, 2017).

Health in All Policies

Health in All Policies (HiAP) is a collaborative approach that integrates health and equity considerations into decision-making across all sectors and policy areas to improve overall community health and reduce disparities. HiAP promotes intersectoral collaboration, aiming for "win-win" scenarios in which health improvements are a co-benefit of decisions made in other sectors. It implies that health consequences should be considered in all public policies (American Public Health Association, 2025).

The video explains the "health in all policies" approach.

A short video from APHA explaining how the health in all policies applies to real-world situations.

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

Video from APHA

A prime example of health policies is those associated with smoking. At the national level, the sale of tobacco products to anyone under 21 years of age is prohibited, and the products must all carry a warning label from the Surgeon General. Additionally, the Food and Drug Administration (FDA) Center for Tobacco Products regulates the manufacturing, marketing, and distribution of tobacco products (US Food and Drug Administration, n.d.). At the state level, California was one of the first states to ban smoking in indoor public spaces and workplaces in 1995. Smoking had been banned in public schools and daycare centers, and taxes on cigarette purchases fund tobacco-prevention programs through the CA Department of Public Health. In the 2000's, additional state legislation made smoking illegal on all government property - including state universities and community colleges - and it is also illegal to smoke in a car with a minor present (California Air Resources Board, n.d.). Cities can also enact local smoking bans to protect their residents from environmental tobacco smoke (secondhand smoke), as the city of Burbank, California, has done. In Burbank, smoking is prohibited in or around any city facility or park, on any public transit or at any station, on sidewalks in the downtown area, outdoor cafes and event venues, as well as service areas (such as a delivery dock for a restaurant, or a ticket line for a concert) (Burbank Municipal Code, 2025).

Health policies also include the appropriation of tax revenue to fund specific government agencies. The Department of Health and Human Services (HHS) budget for 2024 was $2.37 trillion, which includes funding for Medicare/Medicaid, the Centers for Disease Control and Prevention (CDC), National Institute of Health (NIH), Food and Drug Administration (FDA), Health Resources and Services Administration (HRSA), Substance Abuse and Mental Health Administration (SAMHSA), and Indian Health Service (IHS) as well as other agencies (USAspending.gov, 2024).

Reference:

American Public Health Association. (2025). Health in all policies. APHA www.apha.org

Burbank Municipal Code. (2025). Burbank Municipal Code. Codepublishing.Com. www.codepublishing.com

California Air Resources Board. (n.d.). California Tobacco Laws that Reduce ETS Exposure. California Air Resources Board ww2.arb.ca.gov

Shi, & Singh, D. A. (2017). Delivering health care in America. Jones & Bartlett Learning.

US Food and Drug Administration. (n.d.). Tobacco Products. FDA www.fda.gov

This page titled 5.3: Health Policy is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by LibreTexts.

5.4: Types of Law

Public health policy and law are two of the most crucial tools states use to protect their citizens from health threats, and, while distinct, they have interconnected roles in safeguarding public health. Public health law grants the state the power and duty to create the necessary conditions for a healthy population, while also setting limitations on the state's power to restrict individual and business autonomy, privacy, liberty, and property interests (Martin, 2008).

There are four sources of law that influence how public health policy is implemented (Riegelman & Kirkwood, 2025 p106):

- **Constitutional law**: Constitutional law encompasses both the U.S. Constitution and the constitutions of individual states. As discussed previously, state constitutions' primary responsibility is the public good, and they are limited only by the authority of the U.S. Constitution through the Commerce and Due Process Clauses.
- **Legislative law**: Legislative law, also known as statutes, is created by legislative bodies at the local, state, and federal levels. Federal statutes take precedence over conflicting state statutes, provided they align with the constitutional limits on federal government power. Statutes frequently address health issues by directly mandating or prohibiting certain activities. For instance, legislation can authorize government regulations such as professional or institutional licensing, require specific actions such as restaurant inspections, prohibit activities such as smoking in certain areas, or allocate funds to pay for government services or reimburse healthcare providers.
- **Administrative law**: Administrative law is created by executive agencies at the federal, state, and local levels to implement legislative statutes, which are often written broadly. These agencies must follow specific legal procedures and operate within the legislative intent of the original statute. These laws may specify who qualifies for services, how they are delivered, the amount of reimbursement provided, and many other crucial details that impact the daily operation of government programs and services.
- **Judicial law**: Judicial or common law is law created by the courts when they apply constitutional, statutory, or administrative law to specific cases.

The following are some application exercises. Can you tell which type of law denotes each situation?

Exercise 5.4.1

If Congress authorizes funds for the states to build highways contingent on the passage of a state law raising the drinking age to 25, this would be an example of which type of law?

Answer available at the end of this section.

Exercise 5.4.2

If a state court rules that state law permits a resident physician to testify in a malpractice suit to provide information on the expectations of clinical practice in his future specialty, this would be an example of which type of law?

Answer available at the end of this section.

Exercise 5.4.3

If the Department of Health and Human Services writes a series of rules to implement a recently passed bill designed to ensure the safety of newly approved drugs, this would be an example of which type of law?

Answer available at the end of this section.

Exercise 5.4.4

If the United States Supreme Court determines that there is a right to privacy, this would be an example of which type of law?

Answer available at the end of this section.

Reference

Martin, R. (2008). Law, and public health policy. International Encyclopedia of Public Health Aug 26:30–38. doi: 10.1016/B978-012373960-5.00236-7

Riegelman, R. & Kirkwood, B. (2025). Public health 101: improving community health (4th ed). Jones & Bartlett Learning, LLC.

Answers

Exercise 5.4.1
Legislative statute.

Exercise 5.4.2
Judicial law

Exercise 5.4.3
Administrative law

Exercise 5.4.4
Constitutional law

This page titled 5.4: Types of Law is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by LibreTexts.

5.5: Pandemic Response

In 1948, the United Nations established the World Health Organization (WHO), which coordinates responses to international public health issues and emergencies (Wikipedia, 2025). The WHO adopted the International Health Regulations (IHR) in 2005, and they were amended in 2022 to reflect lessons learned from the COVID-19 pandemic. The IHR is a legally binding international agreement that establishes a framework for global health security. The goal is to prevent and control the international spread of diseases and protect public health worldwide (World Health Organization, 2025).

Interestingly, even though the IHR was widely accepted in 2025, the WHO was not provided with the means to enforce it. A decade later, the WHO declared public health emergencies of international concern (PHEIC) for the Influenza (2010) and Ebola (2015) pandemics. It was only after the Ebola pandemic that there was a proper means of enforcement and financial support for the IHR. The amendments were still in the building phases when COVID-19 entered our lives, and in 2021, another international agreement/amendment to the IHR was entered. It is important to note (Riegelman & Kirkwood, 2025 p117):

1. The Director of the World Health Organization has the authority to declare a public health emergency of international concern.
2. The World Health Organization is the coordinating authority on global health issues.
3. The World Health Organization takes the "One Health" approach, connecting the health of humans, animals, and our planet.

It is also important to note that, as of the writing of this text, the United States has withdrawn from the WHO, and the ramifications of this action are yet to be understood. For more information on the withdrawal, you may jump ahead to section 10.3, "World Health Organization."

Reference:

Riegelman, R. & Kirkwood, B. (2025). Public health 101: improving community health (4th ed). Jones & Bartlett Learning, LLC.

Wikipedia. (2025). World Health Organization. Wikipedia www.en.wikipedia.org

World Health Organization. (2025). Media centre. WHO www.emro.who.int

This page titled 5.5: Pandemic Response is shared under a CC BY-NC-SA 4.0 license and was authored, remixed, and/or curated by LibreTexts.

6: NON-COMMUNICABLE DISEASES

Over time, the epidemiological transition shifted from infectious diseases to long-term conditions, which we will term "non-communicable diseases". Understanding the rates and prevalence of non-communicable diseases enables public health to implement interventions, such as urban planning for physical activity, tobacco taxation, and food security policies, to modify the environments where people live, work, and age. Ultimately, the goal is to reduce disease prevalence and health inequities by making the healthy choice the default choice for the population, thereby extending life expectancy and reducing the collective economic burden of long-term disability.

In the following sections, we will discuss the current landscape of non-communicable diseases in the United States and then focus on strategies within a population health approach to reduce their burden.

6.1: Non-Communicable Diseases and Public Health

6.2: Screening

6.3: Interventions

6.4: Genetic Testing

6.5: Research

This page titled 6: Non-Communicable Diseases is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

6.1: Non-Communicable Diseases and Public Health

Non-communicable diseases, also known as chronic diseases, are long-term health conditions that are not caused by an acute infection and cannot be directly transmitted from person to person. The leading causes of death in the non-communicable diseases category are (Centers for Disease Control and Prevention, 2025):

1. Heart disease
2. Cancer
3. Accidents (unintentional injuries)
4. Stroke (cerebrovascular diseases)
5. Chronic lower respiratory diseases
6. Alzheimer's disease
7. Diabetes
8. Nephritis, nephrotic syndrome, and nephrosis
9. Chronic liver disease and cirrhosis

The burden of non-communicable diseases:

Chronic diseases are the top cause of illness, disability, and death in the U.S., driven by key risk factors like smoking, poor nutrition, physical inactivity, and excessive alcohol use. These diseases don't affect everyone equally; certain groups are disproportionately affected due to circumstances that make it difficult for them to maintain a healthy lifestyle (Centers for Disease Control and Prevention, 2024).

Since the 1950s, heart disease and cancer have been the leading causes of death in the United States, and the top five leading causes of death account for 58% of all deaths in 2022 (USA Facts, 2025).

As the population ages, the incidence of non-communicable diseases increases, and their burden is a major driver of rising healthcare costs. As we have already noted in Section 4.5.3 "Elderly", the trends show that by 2030, the 65 and over population will double, reaching 70 million, and by 2050, it will increase by another 20% to 83.7 million (Medical University of South Carolina, n.d.), and with the increase in the elder population so will increase the incidence of non-communicable diseases.

Another note to consider is the impact of opioid overdose on the population. During the late 20th century, deaths from overdose were 20,000 per year; within 20 years, the deaths from overdose rose to 100,000 per year. The widespread availability of rapidly acting prescription opioids has played a key role in the current opioid epidemic. The deaths from opioid overdose tend to be among adolescents or young adults, and they have had a substantial impact on life expectancy, exceeding those from motor vehicle injuries (Riegelman & Kirkwood, 2025, p. 134).

Reference

Centers for Disease Control and Prevention. (2024). About chronic diseases. CDC www.cdc.gov/chronic-disease

Centers for Disease Control and Prevention. (2025). Leading causes of death. CDC www.cdc.gov/nchs/fastats

Medical University of South Carolina. (n.d.). The booming aging population. MUSC www.muschealth.org

Riegelman, R. & Kirkwood, B. (2025). Public health 101: Improving community health (4th ed). Jones & Bartlett Learning, LLC.

USA facts. (2025). What are the leading causes of death in the US? USA Facts www.usafacts.org

This page titled 6.1: Non-Communicable Diseases and Public Health is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

6.2: Screening

Screening for a disease simply means testing asymptomatic individuals. The goal of screening for a disease is to detect its presence at an early stage, when treatment can yield a favorable prognosis. Over time, screening has reduced disability or deaths. It is important to note that screening is not a perfect tool; for example, screening data shows that it reduces a person's risk of dying of cancer by 30% to 60%, but they don't eliminate it (National Center for Biotechnology Information, 2025).

There are four criteria for a successful screening program (Riegelman & Kirkwood, 2025):

- **The disease produces substantial death or disability:** certain diseases, such as cancer and heart diseases, are well-known for being the cause of disability and death in the population. There are other diseases, such as those in childhood, that can cause just as much impairment and disability.
- **Early detection is possible and improves outcomes:** there are instances in which screening is available, but treatment is not. An example is screening smokers with a lung X-ray. By the time cancer is able to be seen in an X-ray, it is already it is too late for treatment.
- **Feasible testing for screening:** the requirement for this criterion is to (1) identify the high-risk population, and to (2) be able to test for false positives (test positives, but in reality do not have the disease) and false negatives (test negative for the disease, but in reality have the disease). The goal is to identify the true positives. The most common strategy used is sequential testing, which simply means that after a positive screening test, a diagnostic test follows.
- **The patient accepts the possible harms and costs of the screening test:** in many instances, the initial screening, such as blood tests, is harmless. However, if the initial tests require a more invasive and costly follow-up (such as surgery), will the patient still agree to the procedure?

When screening tests take place, it is important to notice that:

- One positive screening test is not usually sufficient to diagnose a disease
- Changes within the range of normal can be due to a disease
- The range of normal is not the same for all groups or populations.

Interestingly, Birbeck (2020) offered three main ways population screening can be successful: (1) patients can directly benefit, (2) early diagnosis must be associated with better outcomes, and (3) the cost and risks must not outweigh the benefits. An example of a screening program that did not work was Indiana's mandatory HIV screening for a marriage license in 1994. Within a year of the program's start, many residents were driving across state lines for their marriage licenses. People were inconvenienced, the state lost revenue, and there was little benefit. Records show premarital blood tests were repealed by 2019 (McMaken, 2019).

Let's take the example of colon cancer:

Colon cancer has a high mortality and morbidity and is the second most common cause of death from cancer in both females and males. Early detection (before symptoms arise) improves outcome. Screening for colon cancer has been approved by insurance companies, and patients are frequently undergoing tests (sigmoidoscopy and fecal occult blood testing). This is because the screening is acceptable with respect to costs, harms, and patient acceptance (Riegelman & Kirdwood, 2025).

Reference

Birbeck, G. L. (2000). The benefit of screening must outweigh the risks and costs. The Western Journal of Medicine. May;172(5):308-9. doi: 10.1136/ewjm.172.5.308

McMaken, R. (2019). The pre-marriage blood test in America is now gone. MisesInstitute www.mises.org

National Center for Biotechnology Information. (2025). Screening: Learn more -advantages and disadvantages of screening tests. Institute for Quality and Efficiency in Health Care (IQWiG) https://www.ncbi.nlm.nih.gov/books/NBK611896/

Riegelman, R. & Kirkwood, B. (2025). Public health 101: Improving community health (4th ed). Jones & Bartlett Learning, LLC.

This page titled 6.2: Screening is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

6.3: Interventions

Multiple risk factor reduction intervention

A type of intervention called multiple risk factor reduction aims to address multiple risk factors simultaneously. This type of intervention is most effective when there are group risk factors within a group, or when the risk factors together increase the impact more (sometimes even exponentially) than each risk factor measured alone.

An example of multiple risk factor reduction for heart health involves a person simultaneously quitting smoking, improving their diet, becoming more physically active, losing weight, and managing high blood pressure and high cholesterol through lifestyle changes and, if necessary, medication. This combined approach aims to significantly lower the overall risk of heart attack and stroke more effectively than addressing each risk factor individually (Ebrahim et al., 2006).

Another example of multiple risk factor reduction is the combination of asbestos exposure and cigarette smoking, which severely multiplies the incidence of lung cancer by 50%. If one stops smoking, the incidence declines to 5% (Riegelman & Kirkwood, 2025 p140).

Cost-effective Interventions

Healthcare aims to offer patients interventions that provide the greatest benefits at the lowest cost, meaning lower costs and greater effectiveness. An intervention that is always cost-effective is one that reduces the cost while increasing the net-benefit.

An example of a cost-effective intervention is the childhood vaccination program; the cost of implementing the program is less than the medical and productivity costs averted, making it cost-saving (Centers for Disease Control and Prevention, 2024).

Action	Cost (negative value means cost savings)
Implementation of the childhood vaccination program	$7.5 Billion
Anticipated medical costs & productivity losses	$76.4 Billion
Net costs	-$68.9 Billion

Note that most experts on cost-effectiveness prefer to use the QALYs (quality-adjusted life years) to measure cost-effectiveness. A QALYs may be interpreted as a year of life at full health compared to immediate death; it takes into account the number of life-years saved. In cost-effectiveness analysis, a cost of less than $50,000 per additional QALY is often considered cost-effective in the United States (Riegelman & Kirkwood, 2025, p. 142).

Combining Healthcare and Public Health Intervention

Combining healthcare and public health approaches is effective because it leverages the strengths of both to improve population health by integrating individual-level care with population-level prevention, promoting health equity, and fostering a comprehensive understanding of health needs through shared data and goals (Choi et al., 2022). An example of this application is the opioid crisis. In the 1990s, a new prescription for pain relief entered the market, and we have now been seeing the long-term effects of its use. Many people became addicted to the legally prescribed painkiller, leading to today's overdose of 100,000 per year (this number is close to as many as motor vehicle injuries, suicides, and homicide cases together!) (Rigelman & Kirkwood, 2025 p144). One strategy to help decrease overdose is to work with clinicians to abstain from prescribing it and provide strategies to the population to help taper off the addiction.

Reference

Centers for Disease Control and Prevention. (2024). Cost-effectiveness Analysis. CDC www.cdc.gov

Choi, B.C.K., King, A.S., Graham, K., Bilotta, R., Selby, P., Harvey, B.J., Gupta, N., Morris, S.K., Young, E., Buklis, P., Reynolds, D.L., Rachlis, B., & Upshur, R. (2022). Clinical public health: harnessing the best of both worlds in sickness and in health. Health

Promotion Chronic Disease Prevention in Canada. Oct;42(10):440-444. doi: 10.24095/hpcdp.42.10.03

Ebrahim, S., Beswick, A., Burke, M., & Smith, G. D. (2006). Multiple risk factor interventions for primary prevention of coronary heart disease. Cochrane Database Syst Rev. 2006 Oct 18;(4): CD001561 doi: 10.1002/14651858.CD001561.pub2

Riegelman, R. & Kirkwood, B. (2025). Public health 101: Improving community health (4th ed). Jones & Bartlett Learning, LLC.

This page titled 6.3: Interventions is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

6.4: Genetic Testing

Genetic testing can help decrease the burden of chronic disease by providing critical information for early detection, personalized prevention strategies, and optimized treatment plans. This proactive, precision medicine approach can improve patient outcomes, enhance quality of life, and reduce the overall costs associated with chronic illness (Lee et al., 2025).

One well-known application is the testing for the BRCA gene mutation, which is a hereditary breast-ovarian cancer. Women who test positive for the BRCA mutation have an 80% lifetime risk of developing breast cancer. If a woman is found to have a BRCA gene mutation, her relatives are also offered testing (Rigelman & Kirkwood, 2025, p. 143). Genetic testing can provide treatment options; it is standard practice to perform genetic testing on cancer tissue. Again, the aim here is to find the best treatment and a definite prognosis.

Genetic testing drives personalized medicine in public health by enabling the early detection of inherited predispositions and the selection of targeted therapies, thereby shifting medicine from a one-size-fits-all approach to tailored care that enhances health outcomes for both individuals and the broader population (Funanage, 2021).

Reference

Funanage, V. (2021). Impact of genetic testing on human health. Delaware Journal of Public Health Dec 15;7(5):10–11. doi: 10.32481/djph.2021.12.005

Lee, C.L., Chuang, C.K., Chiu, H.C., Chang, Y.H., Tu, Y.R., Lo, Y.T., Lin, H.Y., & Lin. S.P. (2025). Understanding Genetic Screening: Harnessing Health Information to Prevent Disease Risks. International Journal of Medical Sciences. Jan 21;22(4):903-919. doi: 10.7150/ijms.101219

Riegelman, R. & Kirkwood, B. (2025). Public health 101: Improving community health (4th ed). Jones & Bartlett Learning, LLC.

This page titled 6.4: Genetic Testing is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

6.5: Research

Research is an integral part of the population health approach, and ongoing research is necessary to help us understand and provide further intervention options.

One example of this application is dementia from Alzheimer's disease. As discussed during section 4.5.3 "Elderly", 6.7 million older adults have Alzheimer's, and this number is expected to double by 2060 (Centers for Disease Control and Prevention, 2024). Research indicates that stimulating mental activity, staying physically active, and reducing cardiovascular risk offer moderate benefits for Alzheimer's disease (Riegelman & Kirkwood, 2025 p147).

Public health research is essential for preventing and managing chronic diseases by providing evidence-based strategies to address risk factors, implement effective interventions, and inform health policy. By collecting and analyzing data, researchers help public health professionals understand the causes, distribution, and burden of chronic illnesses (Dauchess, 2025).

Reference

Centers for Disease Control and Prevention. (2024). About dementia. www.cdc.gov/alzheimers

Dauchess, A. (2025). Chronic disease prevention: how public health educators make a difference. Marymount University www.marymount.edu

Riegelman, R. & Kirkwood, B. (2025). Public health 101: Improving community health (4th ed). Jones & Bartlett Learning, LLC.

This page titled 6.5: Research is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

7: COMMUNICABLE DISEASES

Even though non-communicable diseases now dominate the health landscape in many regions, public health as a discipline originated largely to combat the spread of communicable diseases, infectious agents that move from person to person or through the environment. The connection between communicable diseases and public health is deeply historical (you may review section 1.2, "History of Public Health", to gain a picture of this connection) and remains a primary focus of global health security.

In the following pages, we will categorize the top communicable diseases and discuss the public health modalities used to prevent their spread in the population.

7.1: Communicable Diseases and Public Health

7.2: Endemic, Epidemic, and Pandemic

7.3: Tools of Public Health- Barrier

7.4: Tools of Public Health- Screening

7.5: Tools of Public Health- Immunization

7.6: Tools of Public Health- Treatment

7.7: How can elimination or eradication be attained?

7.8: Pandemic Prevention

This page titled 7: Communicable Diseases is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

7.1: Communicable Diseases and Public Health

Communicable diseases are illnesses that can be transmitted from an organism—such as a person or animal —or from a contaminated surface or food to a new host. These infections spread through various routes, including direct contact with bodily fluids or contaminated surfaces, insect bites, or airborne transmission.

The burden of communicable diseases is of greater significance internationally, and internationally, the highest incidence is from HIV/AIDS, tuberculosis, and malaria (Keddy & Gobena, 2024). The international impact in the United States comes from people entering the United States through immigration and as refugees. The Centers for Disease Control and Prevention has changed regulations for persons applying for immigrant or refugee status to ensure that the following communicable diseases are treated before their entry is approved: active tuberculosis, HIV infection, STDs, and infectious leprosy (Centers for Disease Control and Prevention, 2024). Certainly, since we live in a highly connected world, the United States is impacted by diseases in other parts of the world, as explained in section 3.4 (Notifiable Diseases), where on September 15, 2014, the first Ebola case was seen in the United States. And, absolutely, internationally communicable diseases have an impact in the United States and are of great importance to worldwide public health; however, in this section of our book, the focus will be on communicable diseases in the United States.

In the United States, the top communicable diseases can be divided into the following categories (Mcauley, 2025; Centers for Disease Control and Prevention, 2024; Khabbaz et. al, 2014; Elbehiry et al., 2023):

1. **Endemic**: diseases that are of constant presence in a population within a geographic area, these include hepatitis, HIV (epidemic status), STDs (chlamydia, gonorrhea, and HPV), influenza, tuberculosis, and COVID-19 (endemic as of the writing of this text [UCLA Health, 2025]).
2. **Healthcare-associated infections**: diseases usually caused by bacterial infections acquired through the healthcare setting, such as MRSA (methicillin-resistant Staphylococcus aureus), and CRE (carbapenem-resistant Enterobacteriaceae)
3. **Vaccine-preventable diseases:** diseases that are preventable via vaccinations, specifically all the childhood recommended immunizations, such as measles, mumps, and pertussis.
4. **Foodborne diseases:** diseases acquired via the food being eaten, they are often caused by bacteria, viruses, fungi, or parasites or their toxins; the seven most common illnesses are caused by *Campylobacter spp*, *Clostridium perfringens*, *Listeria monocytogenes*, norovirus, nontyphoidal *Salmonella*, and Shiga toxin-producing *Escherichia coli* (STEC), and *Toxoplasma gondii*.
5. **Vector-borne diseases:** diseases transmitted to humans by a host (flea, tick, mosquito, or sometimes another animal such as pigs or chickens). Examples include Lyme disease, hantavirus pulmonary syndrome, swine/avian influenza, and West Nile virus.

Burden of Communicable Diseases

The recommended childhood immunizations for a single US birth cohort prevent around 20 million illnesses and 40,000+ deaths, yielding approximately $70 billion in direct and societal cost savings. Despite the US eliminating measles in 2000, the nation sees 50–100 imported cases annually, mainly due to spillover from European countries. Containing these outbreaks is costly for public health; for example, controlling two 2011 outbreaks that affected only 13 people in Utah cost over $330,000 (Khabbaz et. al, 2014).

Every year, healthcare-associated infections are a major problem in US hospitals, affecting about 20% of patients. These infections are responsible for approximately 99,000 yearly deaths and incur a massive financial burden of around $26 billion to $33 billion in extra medical costs (Khabbaz et. al, 2014). About one in 31 hospital patients acquires a healthcare-associated infection. In 2015, an estimated 687,000 healthcare-associated infections occurred in U.S. acute care hospitals, and about 72,000 hospital patients died during their hospitalizations (Centers for Disease Control and Prevention, 2024).

Annually in the USA, foodborne illnesses affect approximately 48 million people, leading to 128,000 hospitalizations and 3,000 deaths (Khabbaz et. al, 2014). Illnesses caused by all seven pathogens resulted in 53,300 hospitalizations and 931 deaths (Centers for Disease Control and Prevention, 2025).

In the USA, approximately 1.1 million people are living with HIV. The epidemic is concentrated in urban areas and disproportionately affects African-Americans, Latinos, and men who have sex with men (Khabbaz et. al, 2014). In 2022, there were

31,800 estimated new HIV infections (Centers for Disease Control and Prevention, 2024).

Approximately 20 million new sexually transmitted infections (STIs) are acquired annually in the USA, leading to health-care costs of around $16 billion (Khabbaz et. al, 2014). In 2024, the combined total number of cases of chlamydia, gonorrhea, and syphilis declined 9% from 2023, down for a third consecutive year. There were still more than 2.2 million reported STIs in 2024, and compared to a decade ago, overall cases are 13% higher; congenital syphilis is nearly 700% higher (Centers for Disease Control and Prevention, 2025).

COVID-19 caused a greater loss of American life than the cumulative combat deaths from all U.S. military conflicts (Riegelman & Kirkwood, 2025 p149). A study by Loo et. al (2025) projected scenarios (based on data) for vaccine recommendation, and the conclusion provided the following insight: for those 65 years and older, COVID-19 was expected to cause 814,000 hospitalizations and 54,000 deaths from April 2024 to April 2025. Vaccination of high-risk groups only was projected to reduce hospitalizations by 76,000 and deaths by 7,000. Compared with a universal vaccine recommendation, which was projected to provide direct and indirect benefits, additionally preventing 11,000 hospitalizations and 1,000 deaths in those aged 65 years and older. The study's projections suggested that although vaccinating high-risk groups substantially reduced disease burden, maintaining the vaccine recommendation for all individuals could save thousands more lives (Loo et al. 2025).

Reference

Centers for Disease Control and Prevention. (2024). Addendum to the Technical Instructions for Medical Examination of Aliens: Communicable Diseases of Public Health Significance. CDC www.cdc.gov

Centers for Disease Control and Prevention. (2024). Fast facts: HIV in the United States. CDC www.cdc.gov

Centers for Disease Control and Prevention. (2024). HAIs: Repors and Data. CDC www.cdc.gov

Centers for Disease Control and Prevention. (2025). Estimates: Burden of Foodborne Illness in the United States. CDC www.cdc.gov

Centers for Disease Control and Prevention. (2025). Sexually Transmitted Infections Surveillance, 2024 (Provisional). CDC www.cdc.gov

Elbehiry, A., Abalkhail, A., Marzouk, E., Elmanssury, A. E., Almuzaini, A. M., Alfheeaid, H., Alshahrani, M.T., Huraysh, N., Ibrahem, M., Alzaben, F., Alanazi, F,. Alzaben, M., Anagreyyah, S.A., Bayameen, A.M., Draz, A., Abu-Okail, A. (2023). An Overview of the Public Health Challenges in Diagnosing and Controlling Human Foodborne Pathogens. Vaccines (Basel). Mar 24;11(4):725. doi: 10.3390/vaccines11040725

Khabbaz, R. F., Moseley, R. R., Steiner, R. J. Levitt, A. M. & Bell, B. P. (2014). Challenges of infectious disease in the USA. The Lancet Jul 1;384(9937):53–63. doi: 10.1016/S0140-6736(14)60890-4

Keddy, K. H. & Gobena, T. (2024). The continuing challenge of infectious diseases. The Lancet, Volume 24, Issue 8, 800 - 801. The Lancet www.thelancet.com

Loo, S.L., Jung, S.M., Contamin, L., Howerton, E., Bents, S.J., Hochheiser, H., Runge, M.C., Smith, C.P., Carcelén, E.C., Yan, K., Lemaitre, J.C., Przykucki, E., McKee, C.D., Sato, K., Hill, A.L., Chinazzi, M., Davis, J.T., Bay, C., Vespignani, A., Chen, S,. Paul, R., Janies, D., Thill, J.C., Moore, S.M., Perkins, T.A., Srivastava, A., Al Aawar, M., Kaiming, B., Bandekar, S.R., Bouchnita, A., Fox, S.J., Meyers, L.A., Porebski, P., Venkatramanan, S., Lewis, B., Chen, J., Marathe, M., Ben-Nun, M., Turtle, J., Riley, P., Shea, K., Viboud, C., Lessler, J., & Truelove, S. (2025). Scenario Projections of COVID-19 Burden in the US, 2024-2025. JAMA Netw Open. Sep 2;8(9):e2532469. doi: 10.1001/jamanetworkopen.2025.32469

Mcauley, D. (2025). Top 20 contagious diseases in the United States. Global PPh: the Clinician's Ultimate Reference. www.globalrph.com

Riegelman, R. & Kirkwood, B. (2025). Public health 101: Improving community health (4th ed). Jones & Bartlett Learning, LLC.

UCLA Health. (2025). Get COVID-19 booster, though its's now considered endemic. UCLA Health www.uclahealth.org

---

This page titled 7.1: Communicable Diseases and Public Health is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

7.2: Endemic, Epidemic, and Pandemic

In understanding communicable diseases, it is helpful to know the differences among endemic, epidemic, and pandemic, as these directly influence prevention and control efforts.

Endemic

When a disease has a constant presence, its prevalence is expected within a population and is seen at predictable, manageable levels (Centers for Disease Control and Prevention, 2012). For example, some STDs are endemic to the population in California, such as Chlamydia, gonorrhea, and HPV (California Department of Public Health, 2024).

Please note that, in most circumstances, endemic refers to communicable diseases; however, it can also be used to describe other health conditions, such as obesity.

Epidemic

When the number of cases exceeds the expected level, it is often referred to as an epidemic. Similar to endemic, an epidemic can refer to a disease other than a communicable one, such as a health-related behavior (e.g., smoking) (Columbia University Irving Medical Center, 2021). In many cases, an epidemic is a result of (Centers for Disease Control and Prevention, 2012):

1. The disease agent arrived in a new location
2. A stronger mutated version of the disease agent.
3. The disease agent found a way to spread more effectively.
4. A change in the host's reaction to the disease agent often increases the host's susceptibility.
5. The disease has found a new port of entry into the population.

Pandemic

A pandemic is essentially a worldwide epidemic. It's a disease outbreak that has spread across many countries and continents, sickening a large number of people (Centers for Disease Control and Prevention, 2012). The difference between an epidemic and a pandemic is the ease of spread within the population and the fact that a pandemic crosses country boundaries, leading to social disruption and economic loss (Columbia University Irving Medical Center, 2021). The most recent pandemic is the infamous COVID-19 (EBSCO, 2025).

Types of Prevention

In public health, these are the main types of prevention (AbdulRaheem, 2023):

Primordial

Primordial prevention stops the very creation of disease risk factors by tackling the underlying social and environmental causes. It focuses on societal-level prevention to prevent the rise of infectious diseases. Usually, this type of prevention is policy-driven and involves large-scale improvements to prevent certain conditions that allow infectious diseases to spread and become endemic. An example of this type of prevention is the implementation of a water and sewage treatment system.

Primary

Primary prevention refers to actions taken to stop a disease from ever occurring. These strategies focus on eliminating the factors that cause the infection or increasing an individual's resistance to the disease. For example, routine childhood and adult vaccinations, travelers' immunizations, personal hygiene and sanitation, barrier and protective measures, proper food handling, and pre-exposure medication (administered before exposure or infection to prevent disease).

Secondary

Secondary prevention focuses on early detection and prompt intervention to limit the spread of an infection, reduce its severity, and prevent complications. The key idea is to find a disease after a person has been infected but before significant symptoms or irreversible damage occur. Some examples are disease screening and testing (STDs, TB, and Hepatitis C) and post-exposure medication (involves administering medication after a known or suspected exposure to a pathogen to prevent infection from taking hold or to halt its progression).

Tertiary

Tertiary prevention focuses on reducing the impact of an established disease on the patient's function, longevity, and quality of life. The goal is to minimize long-term effects, prevent complications, and promote rehabilitation. For example, long-term management (antiretroviral therapy for HIV, Hepatitis C), complication prevention such as opportunistic infections and sequelae (long-term damage), and rehabilitation (physical or occupational therapy and nutritional support).

In the exercise below, can you identify which category (endemic, epidemic, or pandemic) best fits the scenario provided?

Exercise 7.2.1

Which category (endemic, epidemic, or pandemic) best fits the scenario provided:

22 cases of legionellosis occurred within 3 weeks among residents of a particular neighborhood (usually 0 or 1 per year).

Answer available at the end of this section.

Exercise 7.2.2

Which category (endemic, epidemic, or pandemic) best fits the scenario provided:

Average annual incidence was 364 cases of pulmonary tuberculosis per 100,000 population in one area, compared with national average of 134 cases per 100,000 population

Answer available at the end of this section.

Exercise 7.2.3

Which category (endemic, epidemic, or pandemic) best fits the scenario provided:

Since it was first identified, AIDS has claimed an estimated 35 million lives. Scientists believe that HIV, the virus that causes AIDS, is likely to have evolved from a virus found in chimpanzees that was transferred to humans in West Africa in the 1920s. By the late 20th century, the virus had made its way around the world. For decades, the disease had no known cure, but medication developed in the 1990s now allows people with the disease to experience a normal life span with regular treatment.

Answer available at the end of this section.

Exercise 7.2.4

Which category (endemic, epidemic, or pandemic) best fits the scenario provided:

The Black Death caused an estimated death of 25 million deaths across the world in the 14th century. According to scientists, the outbreak was caused by a bacterium called Yersinia pestis. This Bubonic Plague lasted for about four years.

Answer available at the end of this section.

Exercise 7.2.5

Which category (endemic, epidemic, or pandemic) best fits the scenario provided:

A rapid increase in obesity rates.

Answer available at the end of this section.

Exercise 7.2.6

Which category (endemic, epidemic, or pandemic) best fits the scenario provided:

In the United States in the 1950s, polio terrified communities. Records show it caused cancellations of public events such as fairs, sports games, and swimming pools. In 1952, 58,000 cases of polio occurred in the United States, with 3,000 deaths.

Answer available at the end of this section.

Exercise 7.2.7

Which category (endemic, epidemic, or pandemic) best fits the scenario provided:

The 2025 Ebola outbreak in the United States.

Answer available at the end of this section.

Reference

AbdulRaheem, Y. (2023). Unveiling the Significance and Challenges of Integrating Prevention Levels in Healthcare Practice. Journal of Primary Care & Community Health. Jan-Dec;14:21501319231186500. doi: 10.1177/21501319231186500

California Department of Public Health, Center for Infectious Diseases, Sexually Transmitted Diseases Control Branch. (2024). STDs in California by Disease, County, Year, and Sex. CalHHS www.data.chhs.ca.gov

Centers for Disease Control and Prevention. (2012). Lesson 1: Introduction to epidemiology. CDC Archive www.archive.cdc.gov

Columbia University Irving Medical Center. (2021). Epidemic, Endemic, Pandemic: what are the differences? Columbia Mailman School of Public Health www.publichealth.columbia.edu

EBSCO. (2025). Endemic infections. EBSCO hwww.ebsco.com

Answers

Exercise 7.2.1
Endemic disease

Exercise 7.2.2
Endemic disease

Exercise 7.2.3
Pandemic disease

Exercise 7.2.4
Pandemic disease

Exercise 7.2.5
Epidemic disease

Exercise 7.2.6

Epidemic disease.

Exercise 7.2.7

Epidemic disease.

This page titled 7.2: Endemic, Epidemic, and Pandemic is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

7.3: Tools of Public Health- Barrier

A barrier method of infectious disease prevention uses physical or chemical barriers to block the transmission of pathogens between people or between people and their environments. These methods are essential components of infection control strategies, aimed at protecting vulnerable individuals and reducing the transmission of infectious agents.

Barrier is a type of primary prevention. Barrier methods have been well established and accepted for their effectiveness. Some examples of barrier methods that have been used are (Riegelman & Kirkwood, 2025 p158 &159):

- **Handwashing** to prevent the transmission of germs from one host (or carrier) to another.
- **Insecticide-impregnated net** used to prevent the spread of disease by mosquitoes and other insects that bite at night.
- **Masks, gloves, and gowns** are used to prevent airborne disease from passing from one person to another.
- **Isolation** separates the sick (those showing symptoms) from the healthy population.
- **Quarantine** separates individuals who have been exposed to the disease (and are therefore under suspicion) but who have not yet developed any symptoms. Those in quarantine are kept away from others for the amount of incubation period of the germ in question.

Please note that an in-depth example of isolation and quarantine is found in section 3.4 (Notifiable Diseases), which covers the first Ebola outbreak in the United States and how clinicians handled it.

Reference

Riegelman, R. & Kirkwood, B. (2025). Public health 101: Improving community health (4th ed). Jones & Bartlett Learning, LLC.

This page titled 7.3: Tools of Public Health- Barrier is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

7.4: Tools of Public Health- Screening

Screening prevents infectious diseases by identifying infected individuals, particularly those who are asymptomatic, enabling prompt treatment to stop further spread and reduce mortality. This process involves either mass screening of the entire population or selective screening of high-risk groups, using various tests such as laboratory tests, physical exams, and surveys, to quickly identify pathogens and implement necessary interventions. A similar protocol for non-communicable diseases, covered in section 6.1 "Screening", can also be used to screen for communicable diseases.

In public health and healthcare, screening for TB and syphilis has proven to be an effective part of control, and nowadays, gonorrhea and chlamydia are standard parts of clinical care and public health services. Plus, HIV screening has been recommended for high-risk individuals (Riegelman & Kirkwood, 2025 p159).

Contact tracing is often an important part of screening and has been invaluable in controlling TB and STDs. Contact tracing is the process of identifying people who have recently been in contact with someone diagnosed with an infectious disease (David J. Sencer CDC Museum Public Health Academy, n.d.). Although the health department attempted to perform contact tracing during the COVID-19 pandemic, it did not meet ideal criteria and was most effective when person-to-person transmission was low. Contact tracing is most effective for diseases that meet the following criteria (Riegelman & Kirkwood, 2025 p159):

- They have clear, identifiable transmission routes, making it possible to track contacts.
- They have effective treatments that can reduce the illness's impact.
- They are relatively rare, ensuring that tracing every case remains practical.

Reference

David J. Sencer CDC Museum Public Health Academy. (n.d.). Contact tracing. CDC www.cdc.gov

Riegelman, R. & Kirkwood, B. (2025). Public health 101: Improving community health (4th ed). Jones & Bartlett Learning, LLC.

This page titled 7.4: Tools of Public Health- Screening is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

7.5: Tools of Public Health- Immunization

Immunization is a crucial way to help the population overcome communicable diseases. By stimulating the immune system to recognize and fight pathogens, vaccines prevent illness and reduce transmission, leading to significant reductions or eradication of diseases such as polio, measles, and smallpox.

Immunizations help to overcome the burden of communicable diseases through (Mehlman & Lederman, 2020):

- **Building individual immunity:** Vaccines expose the body to a weakened or inactivated form of a virus or bacterium, allowing the immune system to produce antibodies and develop memory of the pathogen without causing the illness. This primes the immune system, preparing it to fight the real infection if exposed later.
- **Protecting vulnerable populations:** When a high percentage of a community is vaccinated, herd immunity is achieved. Herd immunity makes it difficult for diseases to spread and is especially vital for protecting infants, the elderly, and those with weakened immune systems who are not eligible for certain vaccines.
- **Reducing disease burden:** Immunization significantly reduces the incidence of vaccine-preventable diseases, thereby decreasing the burden of illness, long-term disability, and associated economic costs, such as medical expenses, hospitalizations, and lost wages.
- **Eradicating or controlling diseases:** Widespread immunization has been successful in eradicating diseases such as smallpox (please review section 1.2 "History of Public Health" for an overview of how smallpox was eradicated) and in drastically reducing others, such as polio, measles, and rubella, in many parts of the world.

Even though vaccines have been an integral part of significantly reducing or eradicating some diseases, there are other diseases that have been challenging to produce an effective vaccine, such as a vaccine to prevent the development of HIV/AIDS. Other diseases, such as Influenza A (the same virus as the Spanish Flu of 1918), have a rapid rate of mutation; mass-producing a vaccine requires many months, and the success of vaccination is highly dependent on the match between the vaccine and the current influenza strain.

COVID-19 prompted the development of new forms of vaccination that were originally developed only for Ebola and SARS; these vaccines are called next-generation vaccines. Next-generation vaccines deliver the virus's genetic RNA to the recipient, and the body responds to the viral protein produced from that RNA by generating antibodies and cell-mediated immunity against the virus. The next-generation vaccines used to combat SARS-CoV-2 during the COVID-19 pandemic are called messenger RNA (mRNA) vaccines and viral vector vaccines (Riegelman & Kirkwood, 2025 p159 -160)

Reference

Mehlman, M.J., Lederman, M.M. (2020). Compulsory Immunization Protects Against Infection: What Law and Society Can Do. Pathogens and Immunity. Jan 20;5(1):1-7. doi: 10.20411/pai.v5i1.344

Riegelman, R. & Kirkwood, B. (2025). Public health 101: Improving community health (4th ed). Jones & Bartlett Learning, LLC.

This page titled 7.5: Tools of Public Health- Immunization is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

7.6: Tools of Public Health- Treatment

Treatment of communicable diseases involves mainly antibiotics (for bacterial infections) or antivirals (for viral infections).

Bacterial Infections

Many bacterial infections are treated with antibiotics. The very first antibiotic was penicillin; it was discovered by Alexander Fleming in 1928, it was integral during WWII, and its discovery earned the Nobel Prize in 1945 (Gaynes, 2017). Since its discovery, many other antibiotics have been developed and used to combat bacterial infections. However, since their inception, antibiotics have been overused, with up to 95% used in the outpatient setting and 28% of those prescriptions unnecessary (Centers for Disease Control and Prevention, 2025). In addition to the overprescription of antibiotics, the human factor needs to be acknowledged: when given a certain amount of antibiotics, one needs to take the full amount prescribed (many stop early because they "feel better"). Taking the full prescribed amount allows the antibiotics to kill "ALL" the bacteria, leaving none alive. This is important because if there is one alive, that one is the bacteria that can mutate and become antibiotic-resistant. Some bacteria are known to double every 20 minutes, allowing reinfection by a mutated antibiotic-resistant strain.

Another facet of antibiotic resistance is its use in agriculture. Agriculture uses antibiotics in livestock because they promote growth and prevent disease. This overuse of antibiotics contributes to antibiotic-resistant bacterial strains, which can enter the food chain and pose a risk to human health. Today's antibiotic resistance is largely due to overprescription by providers, patients not taking the full prescribed dose, and overuse in agriculture (World Health Organization, 2023). It is interesting to note that after the COVID-19 pandemic, data show an increase in six bacterial antimicrobial-resistant hospital-onset infections by 20% compared to the pre-COVID-19 period; this increase in antimicrobial resistance to antibiotics is believed to be due an overwhelming in the healthcare facilities and longer hospital stays for those hospitalized which challenged infection control and increased inappropriate antibiotic use (CDC, 2025).

Viral Infections

Treating viral infections is more challenging because treatments do not kill the virus; they only help the body's immune system fight it. There are three ways antivirus treatment works with the body. One, blocking cell receptors so viruses are unable to bind to the human cell and reproduce. Two, activating the immune system cells (Natural Killer Cells and Cytotoxic T-Cells) that search, find, and dispose of viruses. Three, by decreasing the number of viruses in the body (Cleveland Clinic, 2024). HIV infections are not only a public health issue in the United States, but worldwide, and the way of treatment is to take medication, which will decrease the viral load and block the HIV replication. Decreasing the load and preventing the virus from replicating not only gives the body a way to manage the virus but also reduces the risk of transmission (Centers for Disease Control and Prevention, 2024).

One approach used in public health to help treat communicable diseases is **epidemiological treatment**, which involves providing medication to an individual based on evidence suggesting they have been exposed to a disease, even before a definitive laboratory diagnosis is confirmed. Usually, the identification and treatment of those potentially infected is found through contact tracing of the lab-diagnosed infected person. This approach is common for managing STIs and is based on clinical, laboratory, or epidemiological grounds to prevent further transmission in the community and to avoid potential complications for the individual (Carne, 1997).

Reference

Carne, C.A. (1997). Epidemiological treatment and tests of cure in gonococcal infection: evidence for value. Genitourinary Medicine. Feb;73(1):12-5. doi: 10.1136/sti.73.1.12

Centers for Disease Control and Prevention. (2024). Treating HIV. CDC www.cdc.gov

Centers for Disease Control and Prevention. (2025). Antibiotic use in the United States. CDC www.cdc.gov

Centers for Disase Control and Prevention. (2025). Antimicrobial resistance threats in the United States, 2021-2022. CDC www.cdc.gov

Cleveland Clinic. (2024). Antivirals. Cleveland Clinic www.my.clevelandclinic.org

Gaines, R. (2017). The discovery of penicillin--New insights after more than 75 years of clinical use. Emerging Infectious Diseases. May;23(5):849–53. doi: 10.3201/eid2305.161556

World Health Organization. (2023). Antimicrobial resistance. WHO. www.who.int

This page titled 7.6: Tools of Public Health- Treatment is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

7.7: How can elimination or eradication be attained?

Eliminate means to stop the transmission of a disease in a specific geographic area, while **eradicate** means to completely and permanently eliminate a disease worldwide.

Eradication is the ultimate goal, achieved only after a disease has been eliminated from every region (Roess, 2025). Only two diseases have been eradicated: smallpox in 1980 (a human disease that has caused devastation throughout history) and rinderpest in 2011 (a deadly bovine disease) (Roser et al., 2024).

Eradication is difficult to attain. For a disease to be eradicable, it must meet certain criteria, which are quite difficult to satisfy. The following table compares the characteristics that made smallpox eradicable and highlights how polio and HIV have proven much more difficult to eradicate (Riegelman & Kirkwood, 2025, p. 162):

Table 7.7.1: Table is based on information from Riegelman & Kirkwood (2025). Comparison of the categories that favored the eradication of smallpox versus the challenges facing polio and HIV.

Category	Smallpox (Eradicated)	Polio Eradication Attempt Believe Attainable)	HIV (Eradication Nearly Impossible)
Infection Visibility	100% Symptomatic: Every case developed the characteristic, visible rash, making case finding easy and reliable.	Mostly Asymptomatic: Only about 1 in 200 cases causes paralysis; the vast majority are silent carriers who spread the virus.	Years of Latency: Patients can be asymptomatic for years while being highly infectious, making traditional surveillance ineffective.
Timing	Contagious only after symptoms appeared, enabling the successful vaccination strategy (allowing for search and containment).	Contagious before symptoms appear, complicating targeted containment efforts.	Contagious from the point of infection. Transmission involves sensitive behaviors, complicating contact tracing.
Pathogen Characteristics	Single, Stable Virus: A stable DNA virus with a single serotype, meaning one vaccine worked globally.	Multiple Strains: Has three wild serotypes (though two are now eradicated). An RNA virus requires a complex vaccination approach.	Rapid Mutation/Retrovirus: A rapidly mutating RNA retrovirus that integrates its genome into human DNA, making a sterilizing cure or conventional vaccine extremely difficult.
Reservoir	Humans Only: Once transmission was halted, the virus had nowhere else to hide.	Humans Only: While a favorable biological trait, it's offset by the asymptomatic spread.	Humans AND Animals: Animal reservoir exists.
Vaccine Effectiveness	Perfect Vaccine: The vaccine was heat-stable, provided permanent immunity after one or two doses, and was easy to administer.	Vaccine Complications: The vaccine needs to be kept in a constant, monitored cold environment to be effective, and can revert to a paralytic form (vaccine-derived poliovirus).	No Vaccine: No effective vaccine exists. Only treatment of virus replication and load; it does not eliminate HIV from the body (no cure).
Operational Challenge	Overcame challenges through dedicated global cooperation and the clear-cut "search and contain" strategy.	Challenged by political instability and vaccine hesitancy in remaining endemic areas (Afghanistan and Pakistan), the final push for immunization.	Challenged by the need for lifelong adherence to treatment and addressing the complex social and behavioral factors influencing transmission.

Reference

Riegelman, R. & Kirkwood, B. (2025). Public health 101: Improving community health (4th ed). Jones & Bartlett Learning, LLC.

Roess, A. (2025). Measles elimination versus eradication: the difference and why it matters. George Mason University College of Public Health. www.publichealth.gmu.edu

Roser, M., Ochmann, S., Behrens, H., Ritchie, H., & Dadonaite, B. (2024). Eradication of Diseases. Our World in Data www.ourworldindata.org

This page titled 7.7: How can elimination or eradication be attained? is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

7.8: Pandemic Prevention

Pandemics have significant health consequences as well as social, economic, political, and mental health impacts. During a pandemic, the fear of the pathogen takes hold, and social aversion ensues. The economic impact is a reduction in interaction with suppliers and a halt in demand for goods and services that require close contact with people. Interventions, such as lockdowns and isolation, could likely take place. This discourages economic growth.

There have been many pandemics throughout history. The first recorded outbreak was the Plague of Athens in 430 BCE, which killed 25% of Athenians, and its cause remains unknown. The most notorious and fatal of all was the Plague (also known as the Black Death), which dated from 1346 to 1353 in Europe, Asia, and Africa and involved three clinical types: the Bubonic Plague, Septicemic Plague, and Pneumonic Plague. The plague is estimated to have killed around 200 million people, and it is caused by a bacterium transmitted to humans by rat fleas (Sampath et al., 2021). In modern history, the Spanish Flu of 1918-1919 was particularly devastating. Although the Spanish Flu was a pandemic that affected many countries, Spain was not the country that initiated it. In fact, in Spain, it is called the French Flu because the Spanish believe it originated in France (History, 2026). At the time, WWI was underway, newspapers were under censorship, and the Spanish were the ones who reported the pandemic; the name "Spanish Flu" stuck. The Spanish Flu was caused by the H1N1 orthomyxovirus influenza virus, and it is estimated to have caused the death of 150 million people. It was seen as a high-mortality cause of young people (from 15 to 34 years old) (Vitiello et al., 2022). The Spanish Flu killed enough young people to drop the US average life expectancy by 12 years (Sampath et al., 2021).

The most recent and devastating of all the pandemics has been COVID-19. As of the writing of this book, data shows the death toll worldwide due to COVID-19 is 7.1 million people (World Health Organization, 2025). The virus of COVID-19, severe acute respiratory syndrome coronavirus 2 (SARS-COV2), is a highly contagious virus that started in China, and with the world of connectivity of today, it soon infected other parts of the world.

The framework for pandemic prevention involves the following consecutive actions (Riegelman & Kirkwood, 2025 p163):

1. **Detecting**: identifying the index case.
2. **Containing**: isolate the initial case, identify their contacts, and quarantine them.
3. **Mitigating**: once a disease is spreading widely in a community, mitigation aims to reduce new infections, primarily through physically isolating those who are sick.
4. **Immunizing**: gained in one of three ways: through passive immunity, a vaccination, or an active infection.
5. **Monitoring**: Monitoring for new and mutated cases must continue, coupled with an evaluation of the feasibility of eliminating or eradicating the disease.

Reference

History. (2026). Spanish Flu. History www.history.com

World Health Organization. (2025). WHO COVID-19 Dashboard. WHO www.data.who.int

Riegelman, R. & Kirkwood, B. (2025). Public health 101: Improving community health (4th ed). Jones & Bartlett Learning, LLC.

Sampath, S., Khedr, A., Qamar, S., Tekin, A., Singh, R., Green, R., & Kashyap, R. (2021). Pandemics Throughout the History. Cureus. Sep 20;13(9):e18136. doi: 10.7759/cureus.18136

Vitiello, L., Ilari, S., Sansone, L., Belli, M., Cristina, M., Marcolongo, F., Tomino, C., Gatta, L., Mollace, V., Bonassi, S., Muscoli, C., & Russo, P. (2022). Preventive Measures against Pandemics from the Beginning of Civilization to Nowadays-How Everything Has Remained the Same over the Millennia. Journal of Clinical Medicine. Apr 1;11(7):1960. doi: 10.3390/jcm11071960

This page titled 7.8: Pandemic Prevention is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

8: ENVIRONMENTAL HEALTH AND SAFETY

The environment in which people live directly shapes their health, affecting both individuals and communities. Healthy living conditions can lead to positive health outcomes, while unhealthy environments increase the risk of chronic diseases and health hazards, ultimately shortening life expectancy. When the environmental determinants of health (covered in section 1.3) are compromised, the entire population's well-being suffers. These threats may arise naturally or from human activity and social factors.

8.1: Issues in Environmental Health

8.2: Unaltered, Altered, and Built Environments

8.3: Risk Assessments

8.4: Multiplicative Interaction

8.5: Safety

This page titled 8: Environmental Health and Safety is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

8.1: Issues in Environmental Health

The environment in which people live directly shapes their health, affecting both individuals and communities. Healthy living conditions can lead to positive health outcomes, while unhealthy environments increase the risk of chronic diseases and health hazards, ultimately shortening life expectancy. When the environmental determinants of health (covered in section 1.3) are compromised, the entire population's well-being suffers. These threats may arise naturally or from human activity and social factors.

Focusing on environmental determinants of health improvements offers a dual benefit: better direct public health outcomes and an indirect gain through increased productivity and a higher quality of life (Pan American Health Organization, n.d.). The burden of environmental health on population health is significant, contributing to 12 million deaths and illnesses globally due to diseases that arise from how people live or work in unhealthy environments. It causes exacerbating diseases like respiratory, cardiovascular, and infectious diseases, and increases the risk of injuries and mental health problems. This burden is unequally distributed, disproportionately affecting vulnerable populations such as low-income communities, children, the elderly, and those with pre-existing conditions, through factors like air and water pollution, climate events, limited access to healthy food, exposure to toxic by-products from industry and agriculture, and unsafe living conditions (Prüss-Ustün et al., 2016). The 9-minute video below explains how pollution affects health in people worldwide and should be seen as a crisis to all of us.

Pollution: a global public health crisis

Pollution: a global public health crisis

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 from The Lancet explains how pollution affects the health of communities worldwide.

Pollution in the United States

Again, as in the communicable disease section, although environmental health has a major impact on the global population, we will focus specifically on its impact on the United States population. The three biggest environmental problems today are climate change, biodiversity loss, and pollution, which are interconnected crises that threaten public health, the stability of the United States, and the planet, for that matter. The main contributors to climate change are the burning of fossil fuels and deforestation (which increase gases such as carbon dioxide in the atmosphere), which cause the warming of the planet, leading to rising sea levels and extreme temperatures. Human activities cause widespread habitat destruction and ecosystem alteration, leading to species extinction and declines in wildlife populations, which in turn impact food security and livelihoods. Air pollution includes emissions from industry and vehicles; water pollution includes industrial and agricultural runoff; and there is a global crisis of plastic waste. Because most plastics are never recycled, this harms human health, contaminates natural resources, and causes irreversible damage to the environment (Kimber, 2025).

The 2025 U.S. pollution trend shows a worsening overall picture, with climate change-driven events such as extreme heat, drought, and wildfires leading to increased levels of both ozone and particulate pollution. Nearly half of all Americans (156.1 million people) live in areas with failing grades for unhealthy ozone or particle pollution, according to the "State of the Air" 2025 report, despite decades of successful efforts to cut air pollution sources. The report also shows that 85 million people across 115 counties in the United States are breathing air with unhealthy levels of particle pollution that violate the annual air quality standard, year-round.

In addition, based on 2021-2023 data, 77.2 million people lived in counties experiencing unhealthy spikes in particle pollution. This represents a 12.1 million increase over the previous year and marks the seventh consecutive year that health threats from this pollutant have risen (The Medical Society Consortium on Climate & Health, 2025).

Air Pollution

As explained above, air pollution is the biggest problem to public health, and one of the biggest culprits is carbon dioxide. **Carbon dioxide** is a powerful greenhouse gas; its concentration has increased significantly due to human activities such as burning fossil fuels, deforestation, and agricultural practices. An excessive amount of atmospheric carbon dioxide drives global warming, raising the Earth's average temperature. The U.S. Energy Information Administration (EIA) forecasts a 1.8% increase in energy-related carbon dioxide emissions in 2025 (US Energy Information Administration, 2025). Another major pollutant is particulate matter, also known as soot. **Particulate matter** consists of very small airborne particles that are introduced in the air through the combustion of gasoline, oil, diesel fuel, burning of wood, and dust from construction sites, landfills, agriculture, wildfires, industry, and wind-blown (California Air Resources Board, 2025).

Carbon dioxide and particulate matter are tied together both at the source and through climate impacts. The burning of fossil fuels is a common source, simultaneously emitting both carbon dioxide and particulate matter that degrade air quality. Furthermore, climate change driven by elevated carbon dioxide levels increases events such as wildfires and intense dust storms, which are major sources of airborne particulates. Exposure to these particles is harmful to the heart and lungs. Particle pollution is linked to serious health problems, including premature death (especially in vulnerable populations), cardiovascular events like heart attacks and irregular heartbeats, and a variety of respiratory issues such as worsened asthma, reduced lung function, and symptoms like coughing and difficulty breathing (Environmental Protection Agency, 2025; California Air Resources Board, 2025).

The United States is second (only surpassed by China) in carbon dioxide emissions (Central Intelligence Agency, n.d.). In 2023, about 66 million tons were emitted (Environmental Protection Agency, 2025). Under the Clean Air Act of 1963 (amended many times since its inception), the Environmental Protection Agency is required to set and periodically review national air quality standards for six key ambient pollutants: carbon monoxide, lead, nitrogen oxides, ozone, particulate matter, and sulfur dioxide. This ongoing process ensures that the standards remain adequate to protect both public health and the environment, necessitating updates as needed (Environmental Protection Agency, 2024; Wikipedia, n.d.).

Audio news recording from NPR: Air pollution (Borunda, 2025). Transcription is available on the NPR website.

Public Health Approach to Environmental Health

Now that we understand the impact the environment has on population health, we will discuss approaches public health uses to address these issues. The focus will be on the measures public health examines to develop programs and policies that improve environmental health for everyone. The concept of environmental justice is important here. **Environmental justice** is the principle that everyone—regardless of their community—has the right to live and thrive in a safe, healthy environment, to benefit from equal environmental protections, and to have a meaningful say in the decisions that affect them. From this concept, a movement rooted in the civil rights movement, environmentalism, and community mobilization, called the **environmental justice movement,** emerged. It has been noted that marginalized communities face a higher, unfair burden of environmental threats, including exposure to lead, air pollution, hazardous waste, and extreme heat. These exposures are directly linked to damaging health issues such as cancer, asthma and other respiratory illnesses, cardiovascular problems, and neurological and developmental disabilities (American Public Health Association, n.d.)

Reference

American Public Health Association. (n.d.). Environmental Justice. APHA www.apha.org

Borunda, A. (2025). Air pollution still plagues nearly half of Americans. That does a number on our health. NPR www.npr.org

California Air Resources Board. (2025). Inhalable particulate matter and health (PM2.5 and PM10). CAARB ww2.arb.ca.gov

Central Intelligence Agency. (n.d.). The World FactBook: Country comparisons -carbon dioxide emissions. CIA www.cia.gov

Environmental Protection Agency. (2024). NAAQS review analysis. EPA www.epa.gov

Environmental Protection Agency. (2025). Air quality - National summary. EPA www.epa.gov

Environmental Protection Agency. (2025). Health and environmental effects of particulate matter (PM). EPA www.epa.gov

Kimber, R. (2025). The biggest environmental issues we face today. EarthB www.earthyb.com

The Medical Society Consortium on Climate & Health. (2025). State of the air 2025. The Medical Society Consortium on Climate & Health. www.medsocietiesforclimatehealth.org

Pan American Health Organization. (n.d.). Environmental Determinants of Health. PAHO www.paho.org

Prüss-Ustün, A., Wolf, J., Corvalán, C., Bos, R., & Neira, M. (2016). Preventing Disease Through Healthy Environments: A Global Assessment of the Burden of Disease from Environmental Risks. WHO https://iris.who.int/server/api/core...7db110/content

US Energy Information Administration. (2025). Short-term energy outlook. EIA www.eia.gov

Wikipedia. (n.d.). Clean Air Act (United States). Wikipedia www.en.wikipedia.org

This page titled 8.1: Issues in Environmental Health is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

8.2: Unaltered, Altered, and Built Environments

Although the physical environment has three distinct classifications, they are closely interrelated. The physical environment, as we have noticed, affects our health and safety. The three main classifications of the physical environment are: the unaltered, the altered, and the built environment (Riegelman & Kirkwood, 2025 p172, 173):

The **unaltered environment** is the natural environment, which affects the health of the population via the natural ways of being. It includes floods, earthquakes, volcanoes, and even the naturally occurring radon gas. Note that the Earth's population has increased exponentially over the past century, leading to greater resource consumption and waste.

The **altered environment** results from chemicals, radiation, and biological agents introduced by humans. We call this product pollution. An example is the mercury contamination of the Great Lakes.

The **built environment** refers to all the changes and structures made to the physical environment as a direct result of human building and development. The built environment affects humans through injuries, hazardous exposures, and activity levels. Some examples of built environment hazards include lead paint, asbestos, and certain flame retardants used in building and furnishing materials, which can release harmful particles or chemicals over time. Water runoff can carry harmful substances that harm aquatic life and potentially contaminate drinking water supplies. The built environment affects health through construction methods that can impact the ventilation system, leading to communicable diseases or indoor air pollution. In particular, the built environment affects health through particulate air pollution.

It is important to understand the difference between the altered and built environment. The altered environment refers to the impact of human-introduced chemicals, radiation, and biological products on the natural world; while the built environment specifically refers to the man-made structures and physical surroundings created by humans, such as buildings, roads, and infrastructure. While the altered environment focuses on the consequences of human actions (such as pollution) for nature, the built environment focuses on the physical creations themselves. An example of a built-environment hazard is motor-vehicle injuries.

Reference

Riegelman, R. & Kirkwood, B. (2025). Public health 101: Improving community health (4th ed). Jones & Bartlett Learning, LLC.

This page titled 8.2: Unaltered, Altered, and Built Environments is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

8.3: Risk Assessments

Risk assessment formally measures the potential impact of a known hazard. The results of a risk assessment help decision-makers determine whether action is needed to remediate or mitigate environmental threats and provide the scientific basis for setting regulatory policies and developing public health interventions (Israr et al., 2025). The four steps of risk assessment are (US Environmental Protection Agency, 2025; Basu, n.d.):

1. **Hazard identification:** The first step is to identify a potentially harmful agent in the environment, which can be chemical, biological, or physical.
2. **Dose-response assessment:** This step analyzes the relationship between the amount of exposure to the hazard and the likelihood and severity of health effects.
3. **Exposure assessment:** This involves estimating the frequency, magnitude, and duration of human and ecological exposure to the hazard.
4. **Risk characterization:** In the final step, all information from the previous stages is combined to estimate the probability, nature, and magnitude of adverse effects resulting from exposure.

Factors that Affect the Impact of Exposure

The following factors determine the level at which a substance becomes hazardous to the body (HSI, 2025; Health Canada,2023):

Route of exposure: How a substance enters the body affects its impact. Entry can occur via inhalation, ingestion, or skin absorption.

Substance Dosage and Toxicity Level: Any substance can become toxic to the body at sufficiently high levels, even water. The substance's inherent toxicity significantly affects the likelihood of adverse effects. Research of a substance provides a measuring indicator of toxicity called LD50 (Lethal Dose 50). This is the amount of the substance when 50% of the lab animals die from exposure. Also, the timing of the exposure matters; low-dose exposure may have different effects than short-term, high-dose exposure.

Body's Rate of Removal: Once the substance is in the body, it will be processed and excreted. Excretion happens via feces, urine, sweat, or exhaled air. The quicker the body is able to remove and excrete, the less the chance for adverse effects.

Individual Biological Variation: An individual's biological makeup has a tremendous impact on their health. These include genetic factors, age, gender, physical condition, and the individual's body health. Some people are more sensitive to toxicity than others, for example, children, seniors, pregnant women, and indigenous people. Also, some people may be sensitive to the substance, and even a small amount of exposure may trigger an allergic reaction.

Interaction with other substances: In some cases, the exposure to one chemical can be affected by the presence of another. An example of this, which will be explained in more detail later in the chapter, is the co-occurrence of radon gas and smoking.

Public Health Assessment

A public health assessment is a process for evaluating whether exposure to hazardous substances in the environment, such as those found at waste sites, poses a threat to people's health. These assessments determine the levels of a substance, how people might be exposed to it, and what potential harm it could cause. Based on the findings, recommendations are made to protect public health, such as limiting contact with contaminated soil, restricting consumption of certain foods, or cleaning up the site (Ohio Department of Health, n.d.). A core similarity between risk assessment (discussed in the paragraph above) and public health assessments is their exclusive attention to human health impacts.

Over the years, these risk assessments have been controversial and have often taken many years to complete. Often, it takes time

for health consequences to appear in the population. The history of lead's health risks spans from ancient times to the present, with early civilizations documenting lead poisoning and its effects, like colic, anemia, and paralysis. The Romans extensively used lead in pipes, cookware, and wine, which is believed to have caused widespread chronic lead poisoning among the upper classes, leading to symptoms like paralysis, madness, gout, and the cause of abortion. Historians believe Roman emperors were affected by high levels of lead. As we look into the Industrial Revolution, we see that it caused an epidemic of lead exposure and highlighted the dangers of chronic, low-level exposure, leading to the idea that there is no safe threshold for exposure. In the 20th century, the recognition of lead's occupational and environmental toxicity grew, leading to greater public awareness and protective legislation. In the 1970s, it was understood that, due to its bioaccumulative nature, there is no safe threshold for lead exposure. This knowledge led to the gradual removal of lead from products such as paint (1978 in the U.S.) and gasoline (1996 in the U.S.), resulting in a significant drop in exposure levels.

Today, although regulations have reduced risks, lead exposure from sources like old paint and water pipes continues to be a major public health issue, particularly for children, and is linked to a wide range of health problems, including neurological damage, cardiovascular disease, and kidney issues (Rica et al, 2012; Riegelman & Kirkwood, 2025; National Institute of Environmental Health Science, 2025). One well-known lead poisoning incident occurred due to lead in the city's water pipes during the 2014 water crisis in Flint, Michigan. In April 2014, Flint, Michigan, switched its municipal water supply from Lake Huron to the Flint River as a cost-saving measure. The river water was not properly treated, causing aging pipes to corrode and leach lead and other contaminants into the drinking water. Residents immediately reported issues with the water's color and odor, and the lack of corrosion control led to a public health crisis, including elevated blood lead levels in children (Ezell, 2021).

The Flint water crisis, 10 years later (full documentary)

This is a 48-minute documentary about what happened in Flint, Michigan, and the progress made in the 10 years that followed.

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

YouTube video

Ecological Risk Assessment

Ecological risk assessment evaluates the consequences of environmental exposure on non-human organisms, specifically plants and animals. Plants and animals affect human health. In many cases, the results of a risk assessment determine the cleanup goals needed to adequately protect human health and the natural environment (Department of Environmental Conservation, 2025).

The ecological view of environmental health issues was brought to the forefront by Rachel Carson's Silent Spring, a nonfiction book that exposed the dangers of chemical pesticides, such as DDT, to the environment and human health. It is credited with launching the modern environmental movement and led to the ban of DDT in 1972. The book argues that these pesticides accumulate in the food chain, harming wildlife and potentially causing health issues in humans, while criticizing the chemical industry and government for downplaying the risks (Natural Resources Defense Council, 2015; Riegelman & Kirkwood, 2025 p179).

One example of how ecological risk assessment is conducted and its impact on public health is mercury exposure. The history of mercury poisoning spans millennia, from ancient China, where emperors consumed mercury for an attempt at immortality, to ancient Rome, where cinnabar, a mercury-rich mineral, was identified as a poison, and early forms of personal protective equipment were used by workers. In the 1800s, during the industrial era, the dangers of organic mercury were first documented. In the 20th century, numerous incidents of mass mercury poisoning occurred in parts of the world, such as Iraq and Canada, further highlighting the global nature of the problem, and in 2009, an international agreement to control mercury pollution was reached, marking a significant step in addressing the global mercury crisis (Schultz, 2013).

An example of a United States ecological risk assessment for mercury involves the Great Lakes risk assessment, which evaluates threats to the ecosystem. The goal is primarily to evaluate pollution levels (including mercury) alongside other assessments, such as climate change and invasive species. The risks include chemical contamination from urban and agricultural runoff, habitat destruction, and the negative impacts of invasive species. The assessment considers how these threats can harm the environment and human health (National Oceanic and Atmospheric Administration, 2025).

Reference

Basu A. (n.d.). Lecture notes on environmental health risk assessment. Authorea www.authorea.com

Department of Environmental Conservation. (2025). Human health risk assessment. Division of Spill Prevention and Response. The Great State of Alaska www.dec.alaska.gov

Ezell, J. M. & Chase, E. C. (2021). A population-based assessment of physical symptoms and mental health outcomes among adults following the Flint water Crisis. Journal of Urban Health. Oct;98(5):642-653. doi: 10.1007/s11524-021-00525-2

Health Canada (2023). Exposure and health effects of chemicals. Government of Canada www.canada.ca

HSI (2025). What factors influence toxic exposure levels? HSI www.hsi.com

Israr, M., Jain, A., Adusumilli, S. B. K., & Sharma, A. (2025). Chapter 10 - Risk assessment for environmental health and public health. Developments in Environmental Science. Elsevier Ltd. doi.org/10.1016/B978-0-443-33530-3.00010-4

National Institute of Environmental Health Science. (2025). Lead. NIH www.niehs.nih.gov

National Oceanic and Atmospheric Administration. (2025). Great Lakes ecoregion. US Department of Commerce. NOAA www.noaa.gov

Natural Resources Defense Council. (2015). The story of Silent Spring. NRDC www.nrdc.org

Ohio Department of Health. (n.d.). Public Health Assessments. ODH odh.ohio.gov

Riva ,M.A., Lafranconi, A., D'Orso, M.I., & Cesana, G. (2012). Lead poisoning: historical aspects of a paradigmatic "occupational and environmental disease". Safety and Health at Work. Mar;3(1):11-6. doi: 10.5491/SHAW.2012.3.1.11

Riegelman, R. & Kirkwood, B. (2025). Public health 101: Improving community health (4th ed). Jones & Bartlett Learning, LLC.

Schultz, C. (2023). After millennia of heavy use, mercury gets the boot. Smithsonian magazine www.smithsonianmag.com

US Environmental Protection Agency. (2025). Conducting a human health risk assessment. EPA www.epa.gov

This page titled 8.3: Risk Assessments is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

8.4: Multiplicative Interaction

Risk assessment approaches, as explained in the previous page, assume that exposures are isolated events. Therefore, when multiple exposure types are present, the assumption is that the total impact is simply the sum of their individual effects. Growing evidence shows that when exposures interact, the resulting overall impact is often much higher than predicted by just adding their separate effects; this is called multiplicative interaction.

An example of **multiplicative interaction** in public health is the interaction between radon and cigarette smoke. Together, radon gas in households of smokers significantly amplifies lung cancer risk, meaning the combined risk is greater than the sum of individual risks. This occurs because cigarette smoke can promote the growth of **radon-initiated cells** (cells that have undergone malignant transformation due to damage from radon gas decay products), making them more susceptible to the harmful effects of both exposures. Radon is the second leading cause of lung cancer overall, and the leading cause in non-smokers, but the risk for smokers exposed to radon is dramatically higher. For example, at a radon level of 4 pCi/L, the lifetime risk of lung cancer is about 7 in 1,000 for non-smokers but rises to 62 in 1,000 for ever-smokers, according to EPA estimates (Lanz, Mendez, & Philbert, 2013; Vanderweele & Knol, 2014).

Reference

Lantz, P. M., Mendez, D., & Philbert, M. A. (2013). Radon, smoking, and lung cancer: The need to refocus radon control policy. American Journal of Public Health 103, 443_447. doi.org/10.2105/AJPH.2012.300926

Vanderweele, T. J., & Knol, M. J. (2014). A tutorial on interaction. Epidemiologic Methods, vol. 3, no. 1, pp. 33-72. doi.org/10.1515/em-2013-0005

This page titled 8.4: Multiplicative Interaction is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

8.5: Safety

Injuries

Injuries are the primary cause of mortality for people between the ages of 1 and 44. Injuries are categorized as intentional and unintentional. **Intentional injuries** are purpose-driven injuries, such as self-afflicted or inflicted by means of others, such as in bioterrorism. **Unintentional injuries** are non-purpose-driven injuries, and these include motor vehicle crashes, drownings, falls, or fires (Riegelman & Kirkwood, 2025 p185). Public health injury prevention involves strategies to prevent both unintentional (e.g., falls, car crashes) and intentional (e.g., violence, suicide) injuries through interventions like safety regulations, public education, and community-based programs. Key approaches include implementing traffic laws and safer road design, providing accessible naloxone for opioid overdoses, creating secure environments, promoting water safety, and addressing risk factors like alcohol abuse (Office of Disease Prevention and Health Promotion, n.d.).

All-Hazards Approach

Prior to the September 11 attacks and the Anthrax scare of 2001, emergency agencies, such as the Immigration and Naturalization Service, Border Patrol, and Federal Emergency Management Agency, were focused on single threats according to their goals and missions, and collaborating between the agencies was difficult. The terrorist attacks of 2001 revealed critical vulnerabilities in the U.S. public health and emergency response infrastructure, pushing agencies away from focusing narrowly on single threats (like natural disasters or border patrol) toward a more comprehensive strategy with the common understanding of obtaining a common mission and goal. To gather this outcome, the Department of Homeland Security (DHS) was created on November 25, 2002. The DHS combined and reorganized twenty-two departments (EBSCO, 2025).

The **all-hazards approach** in public health is a preparedness framework that focuses on developing core capabilities to respond to a wide range of emergencies rather than planning for each specific threat. It emphasizes that emergency management is a continuous, circular process rather than a linear one. It assumes that many different types of disasters, whether natural, man-made, or health-related, share common needs, such as communication, leadership, and response capacity. Figure 1 below depicts this cycle; it emphasizes that the core components of the cycle are:

- Hazard Identification: Identifying, assessing, and characterizing potential risks.
- Preparedness & Mitigation: Taking proactive steps to reduce impact through remediation, protective measures, and contingency planning.
- Operational Continuity: Developing "Continuity of Operations" plans to ensure essential services remain functional during a crisis.
- Situational Awareness: Monitoring conditions when an event is imminent or occurring to assess the immediate threat.
- Response: Managing the active crisis through event response and post-event actions.
- Recovery & Reconstitution: Restoring services and incorporating "lessons learned" back into future mitigation and preparedness measures.

The All-Hazard Approach is the fundamental strategy DHS uses for all-hazards emergency preparedness and response, born of necessity following the events of 2001. By building these foundational capabilities, public health organizations can be more flexible and effective when any type of disaster strikes, as shown in Figure 1 (Gordon, 2025).



Figure 8.5.1: The cycle of All-Hazards emergency preparedness, where various departments come together to share common needs, such as communication, leadership, and response capacity. (Public Domain; Gordon)

Reference

EBSCO. (2025). Creation of the Department of Homeland Security. EBSCO www.ebsco.com

Gordon, P. (2025). An all-Hazards educational approach to emergency management. Domestic Preparedness www.domesticpreparedness.com

Office of Disease Prevention and Health Promotion. (n.d.). Injury Prevention. Healthy People 2030. US Department of Health and Human Services www.odphp.health.gov

Riegelman, R. & Kirkwood, B. (2025). Public health 101: Improving community health (4th ed). Jones & Bartlett Learning, LLC.

This page titled 8.5: Safety is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

9: HEALTH PROFESSIONALS AND HEALTHCARE SYSTEMS

Health professionals and the healthcare systems are the backbone of public health, moving beyond individual patient care to address the physical, social, and environmental factors that affect entire populations. Health professionals are essential to maintaining the health, resilience, and safety of individuals and communities.

In the following pages, we will discuss how they relate to public health.

9.1: Health Professionals

9.2: Healthcare Institutions

9.3: Healthcare Systems

9.3.1: Health Insurance Terms

9.3.2: Governmental System

9.3.3: Employer-based Systems

9.3.4: Uninsured and Underinsured

This page titled 9: Health Professionals and Healthcare Systems is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

9.1: Health Professionals

In 2023, the health care industry was the largest employment sector in the United States, providing jobs for over 17 million people (Bureau of Health Workforce, 2024). The health professionals in the clinical setting include physicians, nurses, dentists, pharmacists, optometrists, clinical psychologists, and chiropractors; in addition, in recent times it also includes the PAs (Physician's Assistant), NPs (Nurse Practicioners), health administrators, and allied health practitioners (such as physical and occupational therapists, radiologists, laboratory technician, and dental assistants). Health professions are built and maintained by defining and enforcing specific educational requirements, which are fundamentally achieved via credentialing and accreditation.

- **Accreditation** is a formal process that evaluates and recognizes an institution, educational program, or organization as meeting predetermined standards of quality and competence. It serves as a form of quality assurance and is typically conducted by an independent, authorized body composed of professionals in the field.
- **Credentialing** is a formal, detailed process used to establish and verify an individual professional's qualifications, competence, and background. The goal of credentialing is to protect the public by ensuring that the person providing the service is legitimately qualified. It typically involves education and training, licensure, certification, work history, and professional conduct.

It is important to remember that the categories of health professionals are broad and encompass many areas. In this session, we will focus on understanding the roles of the largest groups: physicians, nurses, and the clinician role in public health.

Physicians

The U.S. currently has approximately one million physicians, who are considered essential to the practice of medicine (Federation of State Medical Boards, 2025). It is a dynamic field with subspecialties emerging. The newest physician subspecialties are: cancer immunologist, nocturnist, lifestyle medicine physician, clinical informatics, and medical virtualist (Association of American Medical Colleges, 2025).

Nurses

With approximately 4.7 million registered nurses (RNs), nursing stands as the largest health care profession in the U.S. (American Association of Colleges of Nursing, 2024). The broad legal definition of nursing encompasses many professionals, including Licensed Practical Nurses (LPNs). LPNs provide essential services, often working under the supervision of Registered Nurses (RNs), particularly in hospital settings. There has been a major expansion of graduate-level clinical training programs available to nurses in recent history. To be a Registered Nurse, a state license is required, which may necessitate a Bachelor of Nursing degree. At the graduate level, the Doctor of Nursing Practice (DNP), a clinical doctorate, is quickly becoming central to nursing education and is now recognized as the highest degree in the field. The future for a career in nursing is expanding.

The Doctor of Nursing Practice (DNP) is now central to advanced nursing roles. Over 73,000 nurses have earned this degree since 2004 (American Association of Colleges of Nursing, 2025), and by 2025, the DNP became the required entry-level preparation for both Nurse Practitioners and Certified Registered Nurse Anesthetists (Thayer, 2024). This ongoing pursuit of advanced training is expected to significantly deepen the nursing profession's knowledge base concerning evidence-based practice.

Clinician Role in Public Health

Until the 1960s, the Master of Public Health degree was traditionally focused on preparing physicians and nurses for leadership in health departments. Now, however, public health professionals come from highly diverse academic backgrounds and frequently move straight into master's programs after earning a bachelor's degree. However, clinicians play a pivotal role in enhancing population health (Riegelman & Kirkwood, 2025, p. 213).

Primary Care and Specialty Care clinicians must play important roles in public health coordination. Their duties involve maintaining vigilance for emerging or shifting diseases, promptly reporting adverse effects of drugs, vaccines, and medical devices, and collaborating with public health agencies on screening and contact tracing efforts (Riegelman & Kirkwood, 2025 p213).

All clinicians share the responsibility of advocating for improvements in patient care and the health system overall. Some clinicians, like pediatricians, advocate that it is a core professional duty. Pediatricians' advocacy efforts have profoundly impacted child health policy, leading to major changes such as the mandating of child safety restraints, supporting pediatric HIV/AIDS care, ensuring universal coverage of childhood vaccinations, and pushing for comprehensive health insurance for children. Collaboration among future clinicians, health administrators, and public health specialists is essential as we work to integrate the healthcare and public health systems under the umbrella of population health (Riegelman & Kirkwood, 2025 p213).

Primary, Secondary, and Tertiary Care

The connection between levels of care and public health is foundational. While public health focuses on the population as a whole, the levels of care (primary, secondary, and tertiary) represent the individual points of intervention. The goal of a modern public health system is to shift the focus "upstream"—investing more in primary care to reduce the burden on more expensive, specialized levels of care (White, 2015; Torrey, 2024).

Primary care is the most fundamental, and tertiary care is the most complex. Most individuals move smoothly between levels of care throughout their lifetimes, but typically rely mainly on the primary healthcare arena. Individuals with multiple health concerns or complex needs will rely more heavily on secondary-level care, where they can access specialty care. At the same time, those with critical injuries will, at least temporarily, rely on tertiary care.

Primary Care

Primary Care is the first point of contact, provided by clinicians equipped to manage the vast majority of common health concerns patients present with. The most fundamental access level of health care is primary health care. Primary health care focuses on the prevention of illness and the maintenance of an individual's health. The goals of primary health care are health promotion and disease prevention.

Secondary Care

Secondary Care refers to specialty services delivered by clinicians who focus on a single organ system or a small group of related problems, sometimes referred to as acute care or hospital care. Secondary health care encompasses most of the specialties, practices, providers, and settings to which primary care practitioners provide referrals. Secondary care is the next step when the primary care provider is unable to help a patient successfully manage a healthcare problem. Secondary healthcare goals are to manage an acute problem and return a patient to baseline function, ensure a condition is well controlled, provide education about the condition to reduce the likelihood of recurrence, and return care to the primary care provider.

Tertiary Care

Tertiary Care (or subspecialty care) is typically defined by the specialized institution that provides it (such as academic or highly specialized health centers) or the complex problems it addresses (e.g., Trauma Centers, Burn Centers, or Neonatal Intensive Care Units). The top level in the healthcare pyramid is tertiary health care (Figure 3.6). When patients have healthcare problems, illnesses, or injuries that cannot be managed in primary or secondary care, they seek tertiary care. Tertiary care may involve invasive medical procedures and major surgery. Tertiary health care is offered using specialty tools and medical staff and involves advanced medical treatments and diagnostics. There are fewer tertiary healthcare facilities and hospitals than secondary healthcare ones, and severely ill patients are often transported to distant locations to receive tertiary services. The goals of tertiary health care are similar to those of secondary health care: manage a severe illness, condition, or injury; return a patient to baseline function; ensure a condition is well controlled; and provide all possible care until it is clear that the patient will not survive. Tertiary care is specific and temporary. The patient receives a service, surgery, or supportive treatment and returns to their primary care provider.

Reference

American Association of Colleges of Nursing. (2024). Nursing workforce fact sheet. AACN www.aacnnursing.org

American Association of Colleges of Nursing. (2025). Fact Sheet: The doctor of nursing Practice (DNP). AACN www.aacnnursing.org

Association of American Medical Colleges. (2025). Five emerging medical specialities you've never heard of --until now. AAMC www.aamc.org

Bureau of Health Workforce. (2024). State of the U.S. Health Care Workforce, 2024. HRSA Health Workforce www.bhw.hrsa.gov

Federation of State Medical Boards. (2025). FSMB physician census identifies 1,082,187 licensed physicians in U.S. FSMB www.fsmb.org

Riegelman, R. & Kirkwood, B. (2025). Public health 101: Improving community health (4th ed). Jones & Bartlett Learning, LLC.

Thayer, L. (2024). Understanding nursing degrees: choosing the right path for your career, from ADN to advanced practice. Health eCareers www.healthecareers.com

Torrey, T. (2024). Levels of Medical Care: Primary, Secondary, Tertiary, and Quaternary. VeryWellHealth www.verywellhealth.com

White F. (2015). Primary health care and public health: foundations of universal health systems. Med Princ Pract. 2015;24(2):103-16. doi: 10.1159/000370197

This page titled 9.1: Health Professionals is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

9.2: Healthcare Institutions

There are many ways to categorize healthcare institutions; in this section, we will classify them as inpatient or outpatient facilities.

Inpatient Facilities

Inpatient facilities are places where patients stay for at least 24 hours, including hospitals, skilled nursing facilities, rehabilitation facilities, and hospice institutions. These can be subdivided into short-term stays, such as hospitals. According to the American Hospital Association (AHA), hospitals are licensed institutions with at least six beds whose primary function is to provide diagnostic and therapeutic patient services for medical conditions; they have an organized physician staff; and they provide continuous nursing services under the supervision of registered nurses. Hospitals may be classified by type of service, ownership, size (number of beds), and length of stay (Centers for Disease Control and Prevention, 2024). Hospitals can be categorized into general or specialty hospitals.

Long-term Care Facilities.

Another category of inpatient facilities is long-term care facilities. As we have noted in the previous chapters, we are starting to see an increase in the elderly population (section 4.53) and an increase in substance abuse, such as in opioid addiction (section 4.5.2.3). With this in mind, one way to support this population's needs is through long-term care facilities and rehabilitation centers. Treatment programs for substance use disorders are generally divided into inpatient and outpatient settings. Both approaches aim for rehabilitation but differ significantly in structure. Residential programs are intensive and specifically suited for those with severe addictions (Pantiel, 2025).

Long-term care facilities are residential settings for individuals who require ongoing medical and non-medical support because they cannot live independently. Ranging from assisted living to 24/7 skilled nursing homes and continuing care retirement communities, these facilities are designed to meet the complex needs of the elderly and those with chronic conditions. They provide a safe environment, specialized care, social activities, and assistance with daily tasks and rehabilitation (National Institute on Aging, 2023).

Hospice care can also be either inpatient or outpatient, depending on patient preference or need. Hospice provides support and comfort for terminally ill patients, prioritizing symptom management and quality of life over curative treatment. This specialized care is typically for those with six months or less to live and involves a coordinated team of professionals who tend to the patient's physical, emotional, social, and spiritual well-being (Medicare, n.d.).

Long-term Care Options

This 5-minute video describes long-term care options for the elderly and provides insight into how the residents live.

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

Video source National Institute on Aging

Outpatient facilities

Outpatient facilities provide services for patients who go home within 24 hours. These settings include doctor's offices, laboratory exams, physical therapy visits, and even minor surgeries or procedures that can be performed in a hospital with an exit time of

less than 24 hours. There are a variety of outpatient facilities; we will categorize them as clinical facilities, diagnostic testing, or therapeutic facilities. Therapeutic facilities operate as outpatient centers when they deliver services to patients who live at home and do not need to stay overnight. This flexible model allows individuals to receive necessary treatment—including wellness and prevention (counseling and weight-loss programs), diagnosis (lab tests and MRI scans), treatment (surgeries and chemotherapy), rehabilitation (physical therapy, and drug or alcohol rehabilitation). t, and medication management—while actively managing their daily lives, such as work or school (Kaiser Permanente, 2025).

Clinical facilities provide a broad spectrum of services—from routine check-ups and lab work to specialized treatments and minor surgeries—all without requiring an overnight stay, thus allowing patients to recover at home. Examples include doctors' offices, urgent care clinics, imaging centers, surgery centers, and hospital outpatient departments (Torres, 2022). One type of clinical facility that primarily serves low-income individuals, the uninsured, and those on public assistance is a community health center, also known as a Federally Qualified Health Center (FQHC). These are local, non-profit clinics dedicated to providing affordable, comprehensive healthcare to medically underserved communities. They offer a single-day access model, providing a wide range of services—including primary, preventative, dental, mental health, and substance use treatment—often using sliding-scale fees based on income. Their mission is to increase access to care by reducing barriers related to cost, insurance, and distance. They have over 1,500 organizations nationally that serve close to 34 million people, which is 1 in 10 people nationwide (National Association of Community Health Centers, n.d.).

America's Health Centers: An enduring legacy, value for today and tomorrow

This 5-minute video provides an overview of the history and description of Community Health Centers and the community it serves.

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

Sourced from NACHC

Quality Assessment

Measuring healthcare quality involves using multiple methods: **structure, process, and outcome.** Structure evaluates capacity (e.g., certified staff, technology); process measures adherence to recommended care (e.g., preventive screening, management of chronic conditions); and outcomes assess final results (e.g., patient experience, mortality rates) (Riegelman & Kirkwood, 2025).

Structural measures

Structural measures assess the presumed capacity of a provider or facility to deliver high-quality healthcare by evaluating its structure and resources. For professionals, this includes credentials such as licensure, specialty board certification, and training. For facilities, it covers government certification, private accreditation, physical attributes (including safety), and established policies and procedures. Assessing nursing home quality provides a clear example of structural measurement in practice. Discussions around quality and regulation in this setting heavily rely on structural factors—specifically, the facilities, staffing levels, and training of the workforce who care for residents. Given that many nursing home residents have serious disabilities requiring skilled nursing care, a careful review of the workforce, their training, and their availability is essential to determine if the quality of care is adequate (Institute of Medicine, 1999).

Process measures

Process measures of healthcare performance cover the interpersonal experience (e.g., service, timeliness, provision of patient information, and shared decision-making) and the technical accuracy of care. Technical assessment includes the timeliness

and accuracy of diagnosis, the appropriateness of therapy, and the prevention of complications, mishaps, and errors (such as medication misuse or poor care coordination) that contribute to poor outcomes. Specific to nursing homes, performance issues often involve inadequate care plans, failing to maintain resident dignity and respect, unnecessary use of restraints, and environmental risks such as unsanitary facilities or food (Institute of Medicine, 1999).

Outcomes measures

Outcomes measures are considered the definitive measure of quality, as they reflect the ultimate impact of care on a patient's health. Measurement includes traditional metrics such as risk-adjusted mortality and unintended treatment effects (e.g., infections and symptom relief), as well as disease-specific measures (e.g., 5-year survival). Outcomes also strongly incorporate patient reports on their overall health and functional status (physical, social, and mental ability to perform daily activities). Finally, patient satisfaction is measured by comparing patients' experiences with their expectations (Institute of Medicine, 1999).

Reference

Centers for Disease Control and Prevention. (2024). Hospital. CDC www.cdc.gov

Institute of Medicine. (1999). Measuring the Quality of Health Care: A Statement by The National Roundtable on Health Care Quality. Washington (DC): National Academies Press (US). NIH www.ncbi.nlm.nih.gov

Kaiser Permanente. (2025). Outpatient services. Kaiser Permanente www.healthy.kaiserpermanente.org

Medicare. (n.d.). Hospice care. Medicare www.medicare.gov

National Association of Community Health Centers. (n.d.). What is a community health center? NACHC www.nachc.org

National Institute on Aging. (2023). Long-term Care Facilities: Assisted Living, Nursing Homes, and Other Residential Care. NIH www.nia.nih.gov

Pantiel, T. (2025). Inpatient Vs Outpatient Rehab. Addiction Center www.addictioncenter.com

Riegelman, R. & Kirkwood, B. (2025). Public health 101: Improving community health (4th ed). Jones & Bartlett Learning, LLC.

Torres, C. (2022). Inpatient vs outpatient care and health services. University of Medicine and Health Science www.umhs-sk.org

This page titled 9.2: Healthcare Institutions is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

9.3: Healthcare Systems

Compared to other wealthy countries, the U.S. is unique in lacking a universal or government-sponsored healthcare system. Instead, the federal government (through Medicare and Medicaid) and a few large health insurance companies are the primary payers for healthcare; health insurance is either provided by an employer or purchased privately by individuals.

In 2023, the United States spent $4.9 trillion (or $14,570 per person) on healthcare (American Medical Association, 2025). Data has shown that the trend where the United States is one of the most expensive healthcare countries is upheld over time (Riegelman & Kirkwood, 2025 p238; Buchholz, 2023)

Because of how the U.S. health system is organized, a significant number of people are uninsured. The Affordable Care Act of 2010 aimed to bridge this gap, but has never reached 100% to date. In 2023, the uninsured were at the lowest percentage yet - only 9.5% or around 25.3 million Americans still lacked health insurance coverage (Tolbert et al., 2025). As of the writing of this section, the One Big Beautiful Bill has recently been passed. The One Big Beautiful Bill of 2025 will add significant changes the Affordable Care Act by ending enhanced premium tax credits at the end of 2025, shortening open enrollment, adding strict verification for subsidies, and potentially cutting coverage for millions by increasing costs and complexity, particularly for lower-income individuals and DACA recipients, leading to millions more uninsured (American Medical Association, 2025).

In the following sections, we will cover the basics of the U.S. healthcare system: health insurance terms, government-funded programs, and employer-sponsored health insurance.

Reference

American Medical Association. (2025). Changes to Medicaid, the ACA and other key provisions of the One Big Beautiful Bill Act. AMA www.ama-assn.org

American Medical Association. (2025). Trends in health care spending. AMA www.ama-assn.org

Buchholz, K. (2023). The U.S. has the most expensive healthcare in the world. Statista www.statista.com

Tolbert, J., Bell, C., Cervantes, S., & Singh, R. (2025). The uninsured population and health coverage. KFF www.kff.org

Riegelman, R. & Kirkwood, B. (2025). Public health 101: Improving community health (4th ed). Jones & Bartlett Learning, LLC.

This page titled 9.3: Healthcare Systems is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

9.3.1: Health Insurance Terms

The following are important insurance terms to understand:

Premiums

Premiums are the monthly costs of a health insurance plan, similar to a subscription to a music or television streaming service. Typically, these are set for a year at a time, and insurance companies often increase premiums in subsequent years to offset rising healthcare costs. Premiums are paid by the employer, the insured, or shared by both, and are based on the number of people covered under the healthcare plan (i.e., whether a single person, their spouse, and/or dependent children are covered). Premiums are not based on usage, so the premiums are the cost of the insurance regardless of how frequently the beneficiaries see the doctor or what their healthcare costs are. By collecting premiums, healthy people who visit the doctor less essentially cover the costs of sicker people who use healthcare more. If the insurance company has more healthy folks than sick folks paying premiums, then their financial risk is lower.

Deductable

A deductible is the amount the insured person must pay for healthcare before the insurance "kicks in" to cover the remainder. If a person never gets sick or injured and doesn't visit the doctor throughout the year, they won't have to pay any more than their premiums. If they do get sick or injured, they'll have to pay up to the deductible, after which the insurance pays the rest. Deductibles vary by plan, but typically have an inverse relationship with premiums. If premiums are high, deductibles tend to be lower, and if premiums are lower, deductibles tend to be higher. For example, if a person breaks their arm and goes to the emergency room (ER), the entire visit might cost $ 2,000. If their deductible is $3,500, they would have to pay the full $2,000. However, if they required surgery and a hospital stay totaling $150,000, they would only be responsible for the $ 3,500 deductible before their insurance would begin to help cover the cost. This doesn't mean that the insurance would pay the remainder of the bill; however, see coinsurance and out-of-pocket maximum below (Cigna Healthcare, 2023).

Copayments

A copayment, or copay, is a flat fee charged at the point of service for specific services, such as doctor visits (except the yearly physical), specialty visits, or therapy sessions. For example, if a person visits urgent care for a persistent cough and is then referred to a specialist, each visit might incur a copayment. These don't usually factor into the deductible (Cigna Healthcare, 2023).

Coinsurance

Coinsurance is a cost-sharing arrangement for medical expenses. It's typically a percentage of the total cost paid by the insured, not the insurance company. So, for example, our broken arm from earlier turns into an ER visit, X-rays, a hand surgery, and a hospital stay, totaling $150,000. If the deductible is $3500, the patient would pay that first. Then let's say they had an 80/20 coinsurance plan: their insurance company would pay 80%, and they would pay the remaining 20% of the bill (Cigna Healthcare, 2023).

Out-of-Pocket Maximum

Most plans also have an annual out-of-pocket maximum, which is the total amount the beneficiary would have to pay in a given year. Deductibles, copays, and coinsurance all count toward this maximum. So let's add to our previous example that the person who broke their arm had a $ 7,000 out-of-pocket maximum. They had already paid their $3500 deductible and would then be responsible for 20% of the remaining costs (coinsurance) until the $7000 out-of-pocket maximum is met; after that, the insurance company covers 100% of the remaining costs. So let's say that after this broken arm/hand surgery scenario, they required physical therapy visits. Normally, they would have to pay a $50 copayment for each visit, but since their out-of-pocket maximum had been met, the insurance company covers the copayment for the rest of the year. Now, if the broken arm had only

required the ER visit and an X-ray, and the total bill was $5000, the insured would have to pay the $3500 deductible, then 20% of the remaining $1500 ($300), and would have to pay those $50 copays for physical therapy until the out-of-pocket maximum had been met for the year (Cigna Healthcare, 2023).

Cap

An annual limit is the maximum dollar amount or number of visits that your health insurance plan will pay for specific covered services (such as prescriptions or hospital stays) within one year. Once this cap is reached, you are responsible for paying all remaining healthcare costs for that year (HealthCare.gov, n.d.).

High Deductible Health Plans

Certain High Deductible Health Plans (HDHPs) are also eligible for Health Savings Accounts (HSAs). These are pre-tax savings accounts that roll over each year and can help someone set aside money for a medical emergency. By law, HDHPs must have deductibles and out-of-pocket maximums within specified minimum and maximum limits. For 2024, the minimums were $1,600 deductible for a single person and $3,200 for a family, and the maximums were $8,050 and $16,100, respectively (IRS, 2024). Often, HDHPs have deductibles close to their out-of-pocket maximums, so having an HSA can help prevent medical debt from accruing on credit cards or causing bankruptcy in the event of a very costly medical bill. HDHPs tend to have lower premiums, so they are popular with younger, healthy folks who typically do not need many doctor visits, medications, or procedures (Healthcare.gov, n.d.).

Managed Care Organizations

Managed Care Organizations (MCOs) include both Preferred Provider Organizations (PPOs) and Health Management Organizations (HMOs). MCOs make up the majority of health insurance plans in the marketplace today, including those offered by employers and on state or national marketplaces created by the Affordable Care Act (ACA). Doctors and other healthcare providers are paid in different ways, either through **capitation** (a per-member-per-month fee) or through established amounts for similar services (often called prospective reimbursement). Some organizations contract with a provider organization that pays doctors' and other healthcare providers' salaries, eliminating the need for doctors to be involved in costs at all. These methods reduce the incentives for doctors to perform unnecessary medical procedures or tests, and help prevent premiums from rising uncontrollably. The primary difference between a PPO and an HMO is the choice of doctors. A PPO typically has contracts with providers (or provider organizations), and those “in-network” providers are covered by the insurance plan at a specific percentage of the cost. A PPO patient can go see another doctor, but an “out-of-network” doctor visit would be covered at a lower percentage. For example, an 80/60 plan would cover 80% of the cost for an in-network provider but only 60% for an out-of-network provider. An HMO, on the other hand, covers only specific providers and requires a referral from a primary care physician to see a specialist (Shi & Singh, 2017).

Indemnity or Fee-For-Service Plan

The oldest type of health insurance plan allowed the insured person to visit any doctor, including primary care physicians and specialists. The doctor would then bill the insurance company for any visits or procedures done, the insurance company would pay the portion outlined in the plan, and then the doctor would bill the patient for the remainder. This type of insurance plan is also known as a fee-for-service model, and although it used to be the most common employer-sponsored healthcare plan, it is almost nonexistent today. The problem with this fee-for-service model is that neither doctors nor insurance companies were incentivized to control costs or avoid unnecessary “utilization” or medical procedures. In fact, doctors are incentivized to do just the opposite - perform as many tests and procedures as they can justify, thereby making more money from treating each patient. Similarly, insurance companies could simply pass on the high costs to employers by increasing premiums year over year. Since the 1990s, these plans have become untenable for most employers and beneficiaries (who could be charged large balance bills), and so very few health insurance organizations offer indemnity plans (Shi & Singh, 2017).

Reference

Cigna Healthcare. (2023, October 1). Defining coinsurance, copays, and deductibles. Cigna Healthcare. www.cigna.com

IRS. (2024). Health Savings Accounts and Other Tax-Favored Health Plans Publication 969. Department of the Treasury, Internal

Revenue Service.

HealthCare.gov. (n.d.). What are HSA-eligible plans? HealthCare.gov from www.healthcare.gov

HealthCare.gov (n.d.). Annual limit. HealthCare.gov www.healthcare.gov

Shi, & Singh, D. A. (2017). Delivering health care in America. Jones & Bartlett Learning.

This page titled 9.3.1: Health Insurance Terms is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

9.3.2: Governmental System

The government operates a publicly funded healthcare system. In the U.S., it is offered for specific groups, based on income, age, or military service. The beneficiaries, or people who benefit from these programs, must be in one of the covered groups to be eligible for coverage, and they may also be required to pay premiums or copays for certain healthcare services.

The two main governmental health insurance programs are **Medicare** and **Medicaid**. They represent the dual pillars of federal health insurance. Although both were enacted during the same era, they maintain distinct identities in terms of eligibility requirements, funding, and benefits, as seen in Table 1 below.

Table 1 depicts the main differences between Medicare and Medicaid in terms of the populations they serve, the funding they receive, and who administers them.

Feature	Medicare	Medicaid
Primary Population	Seniors (65+) and those with certain disabilities.	Low-income individuals and families.
Funding	Primarily Federal (Social Security taxes/premiums).	Jointly funded by the Federal and State governments.
Administration	Federal government.	State governments (within federal guidelines).

Medicare

The Social Security Act Amendments of 1965 created a healthcare fund for seniors (people age 65 and older). In 1973, two other groups were added to the list: individuals receiving Social Security benefits and those with end-stage renal disease (ESRD) requiring dialysis (Center for Medicare & Medicaid Services, 2024).

People have two options within Medicare: Original Medicare and Medicare Advantage (also known as Part C). Original Medicare is divided into parts. Part A covers hospitals, skilled nursing facilities, and hospice. Part B, covers services from doctors, outpatient care, home health care, durable equipment, and some preventive services. Private companies run Parts C and D. Part C (also known as the Medicare Advantage Plan) is an alternative to Parts A and B that bundles several coverage types, including Parts A, B, and usually D. It may also include vision, hearing, and dental insurance (US Department of Health and Human Services, 2024; Social Security, n.d.). Therefore, one generally has to choose between Original Medicare and a Medicare Advantage Plan; one cannot have both. Below is a table with a comparison

Table 2 compares Original Medicare and the newer option, Medicare Advantage.

Feature	Original Medicare + Medigap	Medicare Advantage (Part C)
Doctor Choice	Any doctor who takes Medicare (U.S.-wide)	Usually, a specific local network
Monthly Cost	Higher premiums (Part B + Medigap + Part D)	Often $0 or low premiums (plus Part B)
Predictability	High; very few surprise bills	Variable; you pay copays as you go
Drug Coverage	Must buy a separate Part D plan	Usually included in the plan
Extras	No dental, vision, or gym benefits	Often includes dental, vision, and gym

Although it is not mandatory to sign up, enrolling in Medicare when eligible helps avoid lifelong penalties and ensures coverage for essential healthcare services (United Healthcare, 2026). Initial enrollment begins 7 months before the person's 65th birthday, and open enrollment runs from October 15 to December 7 each year (Humana, 2026).

The different parts of Medicare are funded through federal employer and payroll taxes, as well as premiums paid by those who enroll in additional coverage. Since it is a federal program, it provides the same coverage regardless of the beneficiary's state of residence, and anyone who qualifies can enroll, regardless of their income. There are specific income-based premium subsidies designed to assist low-income seniors (Shi & Singh, 2017; Centers for Medicare & Medicaid Services, 2025).

Medicaid

Medicaid is a jointly funded federal and state entitlement program that provides health care coverage to low-income populations and other specifically designated groups. As the nation's largest health insurance system, it plays a critical role in public health, financing nearly half of all U.S. births, 40% of pediatric care, and more than 50% of long-term custodial nursing home services (Riegelman & Kirkwood, 2025 p240).

Wealthier states contribute more than poorer states (Shi & Singh, 2017). Along with the Children's Health Insurance Program (CHIP), Medicaid provides insurance to 77.9 million Americans. People are eligible for the program if they: have a disability or blindness, are over the age of 65, or are children whose family income is up to 133% of the Federal Poverty Level (FPL). Recently, Medicaid expanded coverage to adults with incomes up to 138% of the FPL, but states can opt in or out of this expansion. (Centers for Medicare & Medicaid Services, n.d.). In 2024, the expansion extended eligibility to nearly all adults earning up to $20,783 per year, or $1,731 per month (for an individual). To date, only 10 states have opted out of the expansion: Alabama, Florida, Georgia, Kansas, Mississippi, South Carolina, Tennessee, Texas, Wisconsin, and Wyoming. Texas has the lowest income threshold above which people are ineligible for Medicaid: for parents in a family of three, this is just $ 4,131 per year, or $344 per month (Lopez et al., 2024). Many childless adults in these states fall into the "coverage gap," where they earn too much to qualify for Medicaid but not enough to qualify for federal subsidies to purchase coverage through the marketplace. These folks often work low-wage and/or part-time jobs and may either not be offered employer-sponsored healthcare coverage or find it too expensive (Drake et al., 2024).

During the COVID-19 era, states were required to maintain all enrollees during the emergency period. After the emergency period ended in March 2023, states began the process of "unwinding", or reexamining eligibility for the millions of Americans receiving Medicaid (Unwinding and Returning to Regular Operations after COVID-19, n.d.). Due to technical errors and complex enrollment and renewal processes, many Medicaid recipients were either incorrectly dropped or had difficulty renewing their coverage. About 8% of those previously receiving Medicaid are now ineligible, and consider purchasing health insurance cost-prohibitive. The unwinding process is adding to the number of uninsured Americans (Lopez et al., 2024).

Reference

Centers for Medicare & Medicaid Services. (n.d.). Medicaid eligibility. Medicaid www.medicaid.gov

Centers for Medicare and Medicaid Services. (2024). Brief summaries of Medicare and Medicaid. CMS www.cms.gov

Centers for Medicare & Medicaid Services. (2025). Medicare drug price negotiation program. CMS www.cms.gov

Drake, P., Tolbert, J., Rudowitz, R., & Damico, A. (2024). How Many Uninsured Are in the Coverage Gap and How Many Could be Eligible if All States Adopted the Medicaid Expansion? KFF www.kff.org

Humana. (2026). Medicare's 2026 open enrollment period: what you need to know. Humana www.humana.com

Lopez, L., Sparks, G., Presiado, M., Tolbert, J., Rudowitz, R., Diana, A., & Kirzinger, A. (2024). KFF survey of medicaid unwinding. KFF. www.kff.org

Shi, L. & Singh, D. A. (2017). Delivering health care in America. Jones & Bartlett Learning.

Social Security. (n.d.). Parts of Medicare. SS www.ssa.gov

Riegelman, R. & Kirkwood, B. (2025). Public health 101: Improving community health (4th ed). Jones & Bartlett Learning, LLC.

United Healthcare. (2026). Is Medicare mandatory? United Healthcare https://www.uhc.com/news-articles/me...care-mandatory

US Department of Health and Human Services. (2024). What is Medicare Part C? USHHS www.hhs.gov

Centers for Medicare and Medicaid Services. (n.d.). Unwinding and returning to regular operations after COVID-19. Medicaid www.medicaid.gov

This page titled 9.3.2: Governmental System is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

9.3.3: Employer-based Systems

Employer-based plans represent the single largest category of U.S. health insurance. Nearly 50% of Americans are eligible for coverage through their jobs, making it the most common way people get insured. Today, employer-based plans are based on **experience rating** (also known as medical underwriting). Under an experience rating system, the cost of health insurance is tied to a group's track record. If the employees used a lot of medical services last year, the premiums for both the employer and the staff will likely increase the following year to reflect that higher risk.

From the 1950s through the 1990s, employer-based insurance paid health professionals (or organizations) under a **fee-for-service system**, in which professionals were paid based on charges for specific services provided. This encouraged the provision of many services, thereby increasing healthcare costs (Riegelman & Kirkwood, 2025, p. 241).

In an effort to reduce costs, the federal government encouraged an alternative approach to healthcare in 1973: the Health Maintenance Organization (HMO). In the HMO model, health professionals (or organizations) are paid based on the number of patients enrolled, regardless of the number of services provided; this is called capitation. **Capitation** is a per-member-per-month fee paid to health professionals or their organizations. Some organizations contract with a provider organization that covers doctors' and other healthcare providers' salaries, eliminating the need for doctors to be involved in cost management. These methods reduce the incentives for doctors to perform unnecessary medical procedures or tests, and help prevent premiums from rising uncontrollably (Shi & Singh, 2017). Capitation tends to lead to underuse of services and to reduce costs (Riegelman & Kirkwood, 2025, p. 241). Over time, it was noted that a major complaint among HMO patients was that the system was too restrictive; they wanted to choose their own specialists without waiting for a referral. Therefore, a hybrid HMO was evolved, point-of-service (POS). POS allowed HMO members to go out-of-network if they were willing to pay more.

In conclusion, from the 1990s, two models evolved: from the fee-for-service system, **preferred provider organizations** (PPOs), and from the HMO, the **point-of-service** plans (POSs) (Riegelman & Kirkwood, 2025, p. 241). The primary difference between a PPO and a POS is the choice of doctors, with an HMO being the most restrictive, requiring a primary care doctor to manage all healthcare services.

Table 1 below compares HMO, POS, and PPO in terms of out-of-network coverage, referral requirements, user costs, and provider choice.

Feature	HMO (The Original)	POS (The HMO Hybrid)	PPO (The Fee-for-Service Hybrid)
Out-of-Network?	No (Emergency only)	Yes (But expensive)	Yes (Moderate cost)
Referrals?	Mandatory	Mandatory	Not required
Cost to User	Lowest premiums/copays	Moderate	Highest premiums/copays
Provider Choice	Most Restricted	Moderate	Most Flexible

Reference

Riegelman, R. & Kirkwood, B. (2025). Public health 101: Improving community health (4th ed). Jones & Bartlett Learning, LLC.

Shi, & Singh, D. A. (2017). Delivering health care in America. Jones & Bartlett Learning.

This page titled 9.3.3: Employer-based Systems is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

9.3.4: Uninsured and Underinsured

Until 2010, roughly 22.5% of Americans were either uninsured (15%) or underinsured (7.5%). For these individuals, the lack of adequate protection meant that a significant medical emergency was often a direct path to bankruptcy. Under the Affordable Care Act of 2010, the number of people without insurance dropped to about 10%. The reform addressed the underinsured crisis by mandating that plans cover a standardized set of 'Essential Health Benefits', ensuring that insurance provides meaningful financial protection (Rielgelman & Kirkwood, 2025 p242).

The majority of the uninsured population consists of low-income working families. Because public coverage (like Medicaid) is often more restrictive for adults than for children, those aged 19–64 face higher rates of being uninsured. Furthermore, while the Affordable Care Act has expanded coverage broadly, significant racial and ethnic disparities in insurance access continue to characterize the U.S. healthcare landscape. High costs remain the number one reason Americans go without health insurance, affecting 63% of the uninsured population. This is driven by a lack of employer-sponsored options and the 'Medicaid gap' in non-expansion states. Despite the availability of subsidies, a combination of outreach failures, enrollment barriers, and the high cost of 'affordable' premiums prevents millions from utilizing the coverage they are legally entitled (Tolbert et al, 2024).

It is important to note that according to data, this trend of uninsured is set to shift to an upward trend for 2026 due to two main factors:

- Subsidy expiration. The Affordable Care Act Subsidy has expired on December 31, 2025. Without the subsidy, premiums are increasing by an average of 114%, and experts estimate this will cause about 4 million people to drop coverage because they will no longer be able to afford it (Paulus, 2025).
- Removal of automatic renewal. Medicaid is stopping automatic renewal of coverage and, with it, removing those deemed ineligible under the current status requirement, resulting in coverage being declined for 25 million people. The states hit hardest are those without Medicaid expansion (Hest, 2025).
- The underinsured are those who have insurance but whose out-of-pocket costs are too high relative to their income. This makes it impossible for them to afford care. The trend of inadequate insurance, according to experts, is also expected to shift upward for 2026 due to the following reasons:
- Premium increases. Marketplace premiums are rising by an average of 20-26%, while employer-sponsored insurance (the source for 164 million Americans) is rising by 6-9%, nearly triple the inflation rate (Heimall, 2025).
- High deductible. Deductibles for health plans have increased dramatically; for example, an individual plan is expected to rise from $7,476 to $10,600. This may mean that many people will need to pay for coverage out of pocket (Long, Lo, Wallace, & Pestaina, 2026).

As this book is being written, we are at the beginning of 2026, and it seems we, as a nation and in public health, will face some challenges ahead.

Reference

Heimall, M. (2025). How federal spending cuts will increase health care costs in 2026. Health Well Foundation www.healthwellfoundation.org

Hest, R. (2025). 15 years of the Affordable Care Act: more Americans than evern have health insurance coverage. SHADAC www.shadac.org

Long, M., Lo, J., Wallace, R., & Pestaina, K. (2026). Policy changes brind renewed focus on high-deductable health plans. Kaiser Family Foundation www.kff.org

Paulus, N. (2025). Uninsured Americans in 2026: 27 million without coverage as ADA subsidies face expiration. MoneyGeek www.moneygeek.com

Riegelman, R. & Kirkwood, B. (2025). Public health 101: Improving community health (4th ed). Jones & Bartlett Learning, LLC.

Tolbert, J. Cervantes, S. & Bell, C. (2024). Key facts about the uninsured population. Kaiser Family Foundation www.kff.org

This page titled 9.3.4: Uninsured and Underinsured is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

10: PUBLIC HEALTH INSTITUTIONS AND SYSTEMS

Public health agencies operate with a primary mission to prevent disease, prolong life, and promote health across entire populations. As you have noticed, public health is involved in the health of the public in some aspects through the private sector; however, it has the greatest impact on the health of the population through government agencies.

In the following pages, we will cover the essential public health services, the various public health government agencies, and their roles in improving the health of the populations they serve.

10.1: Essential Public Health Services

10.2: U.S. Public Health Agencies

10.2.1: Federal Agencies

10.2.2: State and County Health Agencies

10.2.3: Quasi-Governmental Organizations

10.3: The World Health Organization

This page titled 10: Public Health Institutions and Systems is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

10.1: Essential Public Health Services

Public health agencies have three core functions (Riegelman & Kirkwood, 2025 p264):

- **Assessment:** understand the community's health status and identify emerging threats.
- **Policy development:** work to create systemic solutions.
- **Assurance:** ensure that the necessary services are actually reaching the people who need them.

To build on the three main public health functions, public health agencies follow a framework known as the 10 Essential Public Health Services, listed below. This framework, which was updated in 2020 to place equity at the center, ensures that agencies address the root causes of health issues rather than just the symptoms. An illustration with equity at the center and all 10 essential public health services around it is shown in Figure 1 below (Krisberg, 2020; Castrucci, 2021; Centers for Disease Control and Prevention, 2024). The 10 Essential Public Health Services:

1. Assess and monitor population health status, factors that influence health, and community needs and assets
2. Investigate, diagnose, and address health problems and hazards affecting the population
3. Communicate effectively to inform and educate people about health, factors that influence it, and how to improve it
4. Strengthen, support, and mobilize communities and partnerships to improve health
5. Create, champion, and implement policies, plans, and laws that impact health
6. Utilize legal and regulatory actions designed to improve and protect the public's health
7. Assure an effective system that enables equitable access to the individual services and care needed to be healthy
8. Build and support a diverse and skilled public health workforce
9. Improve and innovate public health functions through ongoing evaluation, research, and continuous quality improvement
10. Build and maintain a strong organizational infrastructure for public health.



Figure 10.1.1:

The 10 Essential Public Health Services, rooted in equity at the center. (Public Domain; CDC)

Reference

Castrucci, B. C. (2021). The "10 Essential Public Health Services" is the common framework for communicating about public health. American Journal of Public Health Apr;111(4):598-599. doi: 10.2105/AJPH.2021.306189

Centers for Disease Prevention and Control. (2024). 10 Essential Public Health Services. CDC www.cdc.gov

Krisberg, K. (2020). Equity at the center of the revised 10 essential public health services. APHA www.thenationshealth.org

Riegelman, R. & Kirkwood, B. (2025). Public health 101: Improving community health (4th ed). Jones & Bartlett Learning, LLC.

This page titled 10.1: Essential Public Health Services is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

10.2: U.S. Public Health Agencies

United States public health agencies serve the public by monitoring health, preventing disease, promoting wellness through education and policy, responding to emergencies, ensuring safe environments (food, water), and ensuring equitable access to care, all guided by core functions like surveillance, investigation, communication, and community mobilization, often via federal and state/local entities. This system is legally grounded in the U.S. Constitution and a tiered legislative framework (for details, please see section 5.2 on police powers), with a network of dedicated agencies at every level serving as the nation's organizational foundation (Michaud, Kates, Oum, & Rouw, 2025).

Public health agencies are part of the government, and in the United States, the government has three branches (Executive, Legislative, and Judicial). Therefore, all three influence public health.

In this section, we will cover how the branches of government promote public health.

Reference

Michaud, J., Kates, J., Oum, S., & Rouw, A. (2025). What is public health? Kaiser Family Foundation www.kff.org

This page titled 10.2: U.S. Public Health Agencies is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

10.2.1: Federal Agencies

The federal government rarely delivers public health services directly; it exerts significant influence by setting national goals, policies, and regulatory standards. It further sustains the healthcare system by funding care for vulnerable groups (via programs like Medicare and Medicaid), investing in medical research and education, and developing the technological tools necessary to strengthen public health infrastructure nationwide (Institute of Medicine, 2002).

The federal government manages public health through a system involving all three branches of government (Executive, Legislative, and Judicial). Public health oversight is distributed among various agencies under the President's leadership. These agencies possess the legal authority to establish national policies, particularly regarding the movement of people and goods. Key powers include regulating quarantine and isolation for individuals entering the country, enforcing border and migration controls for health reasons (such as Title 42), and managing public health safety measures related to interstate commerce and travel. The federal government's role is as follows (Michaud, Kates, Oum, & Rouw, 2025):

- **The Executive Branch (The President):** This branch carries out and enforces the laws. Federal agencies (such as the FDA) fall under this branch and handle the daily work of monitoring food safety, tracking diseases, and managing health programs.
- **The Legislative Branch (Congress):** This branch writes the laws that govern public health. It also determines how much funding agencies like the CDC or NIH receive each year.
- **The Judicial Branch (The Courts):** This branch interprets the laws. When there are disputes over public health mandates—such as whether the government has the power to require vaccines or impose environmental regulations—the courts decide whether those actions are lawful under the U.S. Constitution.

As of 2026, the federal public health landscape is undergoing a significant reorganization under the "Make America Healthy Again" (MAHA) initiative, which is consolidating several traditional agencies into new divisions to streamline operations. In the United States, federal public health is managed through several specialized agencies. Most of these sit within the Department of Health and Human Services (HHS), but other departments also handle specific health-related tasks, such as environmental safety and food inspection (Institute of Medicine, 1988). Key federal agencies responsible for the administration and oversight of public health in the U.S. include the following:

Department of Health and Human Services

The Department of Health and Human Services (DHHS) leads national public health efforts, primarily through the various agencies that form the U.S. Public Health Service. Some of the key agencies are listed below. It is important to note that Congress exerts oversight by reviewing program authorizations and budgets through various House and Senate committees that share responsibility for DHHS and broader federal health activities. As the primary federal hub of the nation’s public health system, the DHHS coordinates with other federal departments and state and local agencies. Its core functions include establishing policy, funding public health initiatives, protecting the population, and managing health data. Additionally, the department focuses on strengthening health infrastructure and directly overseeing the delivery of specific medical services (such as community health centers and maternal and child health services) (Institute of Medicine, 2002). The following are the most prominent agencies in the DHHS:

Centers for Disease Control and Prevention

The Centers for Disease Control and Prevention (CDC) is the federal government’s premier public health authority, focusing on improving national health outcomes and managing emergency responses. The agency is organized into a central Director’s Office, a global health center, and nine specialized national centers that house expert researchers, advanced laboratories, and communication networks. Beyond its internal research, a primary pillar of the CDC’s mission is providing critical funding and technical expertise to bolster state and local health departments (Michaud, Kates, Oum, & Rouw, 2025).

Food and Drug Administration

The Food and Drug Administration (FDA) serves as a critical regulatory guardian, tasked with safeguarding public health by

verifying the safety and effectiveness of a wide array of products. Its oversight ensures that human and veterinary medicines, biological products, and medical devices are both secure and functional before reaching the public. A primary function of the FDA is to conduct rigorous review and authorization of all prescription medications, vaccines, and other high-risk health technologies. Beyond medicine, the agency monitors significant portions of the nation's food supply, regulates cosmetics, and manages products that emit radiation (Michaud, Kates, Oum, & Rouw, 2025).

Administration for Strategic Preparedness and Response

Administration for Strategic Preparedness and Response (ASPR) serves as the lead division for managing the medical and public health aspects of disasters and emergencies. Its mission spans the entire crisis lifecycle: preparing for threats, coordinating the immediate response, and guiding long-term recovery efforts. ASPR strengthens national resilience by developing medical countermeasures, providing technical guidance to state and local partners, and maintaining critical supplies to ensure the country is ready for biological, chemical, or natural threats (Michaud, Kates, Oum, & Rouw, 2025).

U.S. Department of Agriculture

The US Department of Agriculture (USDA) impacts public health primarily through food safety (inspecting meat, poultry, eggs), nutrition programs (like SNAP, school lunches, dietary guidelines), and rural health initiatives, ensuring safe food, fighting hunger, promoting healthy eating, and supporting rural infrastructure, all while conducting research on food-borne illnesses and nutritional science (U.S. Department of Agriculture, 2026).

Environmental Protection Agency

Environmental Protection Agency (EPA) protects public health by regulating pollutants, setting environmental standards for clean air and water, researching health impacts of chemicals, managing hazardous waste, and ensuring safe pesticides, all through developing regulations, enforcing laws, and collaborating with health officials to prevent diseases from environmental factors like pollution and toxins (Environmental Protection Agency, 2025).

Indian Health Services

The Indian Health Services (IHS) offers direct medical and wellness services to tribal communities. Supporting approximately 550 federally recognized tribes across a 35-state service area (Indian Health Services, n.d.).

National Institute of Health

The National Institute of Health (NIH) is the primary agency for biomedical and health-related research, operating under the Department of Health and Human Services. With over 27 specialized institutes and centers, it conducts in-house research and supports scientists nationwide to improve health, lengthen life, and reduce illness (National Institute of Health, n.d.)

Reference

Environmental Protection Agency. (2025). Human Exposure and Health. EPA. www.epa.gov

Indian Health Services (n.d.). About IHS. IHS www.ihs.gov

Institute of Medicine. (1988). The Future of Public Health. Washington (DC): National Academies Press. Summary of the Public Health System in the United States. National Library of Medicine www.ncbi.nlm.nih.gov

Institute of Medicine. (2002). The future of public health in the 21st Century. Washington (DC): National Academy Press. The governmental public health infrastructure. www.ncbi.nlm.nih.gov

Michaud, J., Kates, J., Oum, S., & Rouw, A. (2025). What is public health? Kaiser Family Foundation www.kff.org

National Institute of Health. (n.d.). About NIH. NIH www.nih.gov

U.S. Department of Agriculture. (2026). Health and Safety. USDA www.usda.gov

This page titled 10.2.1: Federal Agencies is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

10.2.2: State and County Health Agencies

While the federal government primarily functions as a resource provider, setting national standards, funding research, and coordinating infrastructure, state and local agencies are the frontline providers of direct services such as vaccinations and food safety inspections. Because the federal government lacks local "police powers," it relies on states to implement policies, resulting in a patchwork of health systems in which local authorities adapt national guidelines to meet their specific community needs (Institute of Medicine, 2002).

Across the country, the structure and authority of state and local health departments vary significantly. While every state maintains a public health agency, its structure varies: some are standalone departments, while others are nested within larger human services agencies. The power dynamic between state and local levels also falls into three primary categories (Institute of Medicine, 2002):

- **Centralized:** The state agency maintains direct control and oversight over local offices (e.g., Florida, Georgia, Arkansas, and Missouri).
- **Decentralized:** Local agencies operate independently under the control of counties or townships rather than the state (e.g., California, Ohio, Illinois).
- **State-Only:** There are no local agencies, leaving the state department as the sole authority (e.g., Iowa, North Dakota).

Public health agencies vary widely in their scope and authority at both the state and local levels. While most state agencies share core responsibilities—such as managing immunizations, tracking infectious diseases, and licensing healthcare providers—they differ in their broader mandates. For instance, some states include mental health, substance abuse, and Medicaid oversight within their public health department's portfolio, while others house these programs in separate government entities. This structural variety complicates the development of a consistent national agenda to improve public health systems (Institute of Medicine, 2002).

However, in essence, 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.

State Health Agencies' Functions and Responsibilities:

- **Disease Surveillance and Control**: State health agencies monitor disease prevalence, conduct investigations, and implement control measures to prevent the spread of infectious diseases within the state.
- **Health Regulations**: They develop and enforce regulations and guidelines in 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 for responses to public health emergencies, including 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 programs and services to support the health and well-being of mothers and children, including prenatal care and child health.
- **Regulatory Oversight**: They regulate healthcare facilities, healthcare providers, and health insurance to ensure quality and safety standards are met.

Local Health Departments' Typical Responsibilities:

- **Primary Care and Clinical Services**: Local health departments offer primary care, immunizations, family planning, and other

clinical services to the community.

- **Community Health Assessment and Planning**: They assess the local community's health needs and, in collaboration with community stakeholders, develop health improvement plans.
- **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, including water quality, air quality, and sanitation, to protect public health.

Reference

Institute of Medicine. (2002). The future of public health in the 21st Century. Washington (DC): National Academy Press. The governmental public health infrastructure. www.ncbi.nlm.nih.gov

This page titled 10.2.2: State and County Health Agencies is shared under a CC BY 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 4.4: State and County Health Agencies by Erin Calderone is licensed CC BY 4.0.

10.2.3: Quasi-Governmental Organizations

Quasi-Governmental Organizations are hybrid entities that blend the characteristics of public government bodies with the operational style of private companies. While established by law to manage essential public services, they operate independently from traditional government departments to maintain private-sector flexibility while remaining publicly accountable. These "in-between" organizations typically receive government funding and oversight but retain the authority to manage their own day-to-day operations. Their key characteristics are that they are hybrid in nature, serve a public purpose, operate independently, have a governmental link, and, because of that link, are accountable despite their independence (Mead & Warren, 2016).

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, it 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), 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)**: 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:** 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):** 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):** is an organization that represents local health departments across the United States. It advances public health at the community level by addressing local needs and priorities.
- **The American Public Health Association (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.

Reference

Mead, J. & Warren K. (2026). Quasi-Governmental organizations at the local level: publicly-appointed directors leading nonprofit organizations. Cleveland State University www.engagedscholarship.csuohio.edu

This page titled 10.2.3: Quasi-Governmental Organizations is shared under a CC BY 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

- 4.3: Quasi-Governmental Organizations by Erin Calderone is licensed CC BY 4.0.

10.3: The World Health Organization

The World Health Organization (WHO) is a specialized agency of the United Nations, founded in 1948, and it serves as the global authority on health, coordinating international responses to health threats and establishing universal standards for medicines and disease classification (such as the ICD -International Classification of Diseases). By monitoring global health trends and providing technical expertise, the WHO helps nations strengthen their health systems, promote health equity, and address the social determinants of health. Their work spans emergency leadership, disease prevention, and advancing universal health coverage through evidence-based guidelines and community empowerment (World Health Organization, 2025).

The WHO responsibilities can be divided into four parts:

- **Global surveillance and early warning:** It monitors thousands of data points daily to identify potential outbreaks before they become pandemics. It provides International Health Regulations, which legally require countries to report specific disease outbreaks, such as Ebola, polio, plague, and anthrax (Travers, 2025; Adams, 2014).
- **Setting norms and standards:** It establishes the scientific guidelines that national health departments use to make decisions. It provides treatment protocols that ensure evidence-based guidelines (Thomas, 2024).
- **Emergency preparedness and response:** It coordinates the international response to ensure resources are deployed where they are needed most (Thomas, 2024).
- **Strengthening health systems:** It helps countries build the capacity to care for their own citizens by working with governments to expand access to essential health services and reduce the financial burden on patients, and provides technical support to train doctors, nurses, and laboratory technicians in regions with weak health infrastructure (World Health Organization, 2026).

Table 1: The WHO is headquartered in Geneva, Switzerland. It operates through six regional offices and 150 country offices (Ogbu & Arah, 2016).

Region	Regional Office	HQ Location
Africa (AFRO)	Regional Office for Africa	Brazzaville, Republic of Congo
Americas (PAHO/AMRO)	Pan American Health Organization	Washington, D.C., USA
South-East Asia (SEARO)	Regional Office for South-East Asia	New Delhi, India
Europe (EURO)	Regional Office for Europe	Copenhagen, Denmark
Eastern Mediterranean (EMRO)	Regional Office for the Eastern Mediterranean	Cairo, Egypt
Western Pacific (WPRO)	Regional Office for the Western Pacific	Manila, Philippines

WHO's budget comprises two distinct streams: assessed contributions—set according to each country's wealth—and flexible voluntary contributions from public and private stakeholders (World Health Organization, 2026). As noted in Figure 1 below, the United States is one of the largest contributors to WHO funding, with a contribution of $490 million. The next-largest contributors are the Bill and Melinda Gates Foundation, contributing $460 million, and the United Kingdom, with $450 million. The middle-tier countries are Germany with $380 million and the European Commission with $260 million. The lower third of the list consists of China, Romania, and Qatar, each contributing under $50 million.

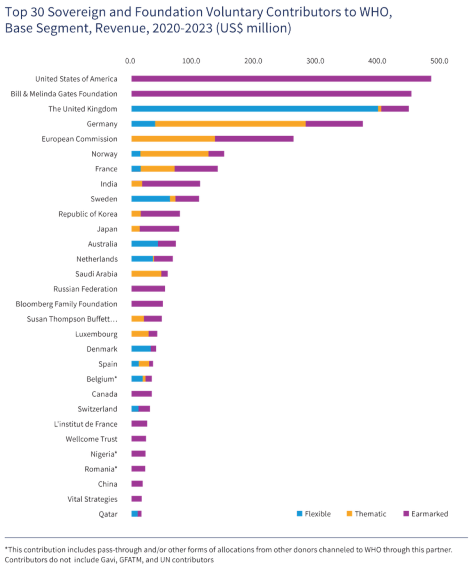


Figure 10.3.1: Top 30 Sovereign and Foundation Voluntary Contributors to WHO, Base Segment Revenue for 2020-2023 (US$ Million) (CC BY-NC-SA 3.0 IGO; WHO)

On January 20, 2025, President Trump withdrew the United States from membership in the WHO (The White House, 2025). The administration's reasons for the withdrawal were (The White House, 2025; Emanuel & Lambert, 2026; Dall, 2025):

- **Mishandling of COVID-19:** Trump accused the WHO of "severely mismanaging and covering up" the spread of the virus and failing to hold China accountable for its origins.
- **Political Bias:** The executive order claimed the organization lacked independence and was subject to "inappropriate political influence" from member states, specifically citing a bias toward the Chinese government.
- **Unfair Financial Burden:** Trump argued that U.S. financial contributions were "unfairly onerous" and "far out of proportion" relative to those of other countries. He noted that while the U.S. was the largest donor, China contributed significantly less despite having a much larger population.
- **Failure to Reform:** The administration cited a long-standing "failure to adopt urgently needed reforms" despite repeated U.S. demands for transparency and accountability.
- **Sovereignty Concerns:** Trump opposed the WHO Pandemic Agreement then under negotiation, viewing it as an infringement on American sovereignty, primarily because it was seen as centralizing global authority over national health decisions (Hart, 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 extend not only to the WHO's health and humanitarian efforts around the globe but also to the U.S.'s capacity to respond to future global health threats (Yazdi-Feyzabadi et al., 2025).

World leaders and public health experts have expressed deep concern over the United States' withdrawal from the World Health Organization. The following are the primary reasons they view the departure as a mistake:

- **Weakened global pandemic defenses:** Leaders argue that pandemics by nature do not respect borders. By withdrawing, the U.S. disrupts the unified global surveillance system used to track emerging pathogens. This includes loss of early warning, global surveillance, and a fragmented response to the other members (countries) because the United States is a significant technical and financial contributor to the coordination center (John Hopkins Bloomberg School of Public Health, 2025; Infectious Diseases Society of America, 2026).
- **Diminished U.S. diplomatic influence:** Leaders see the withdrawal as a "surrender" of global leadership. Experts warn that the U.S. departure creates a leadership vacuum that other powers, such as China, Russia, Saudi Arabia, and India, can fill, allowing them to exert greater influence over international health standards and policies. Former health officials argue that the best way to "fix" or reform the WHO is from the inside. By leaving, the U.S. loses its ability to advocate for the very transparency and accountability reforms it seeks (Park, 2026).
- **Immediate threat to life-saving programs:** The U.S. has historically been the WHO's largest donor (contributing roughly 15–20% of its budget; see the graphic above for the budget breakdown). Its departure creates a massive funding gap for critical initiatives, such as eradication efforts (such as polio) and control of chronic diseases (HIV/AIDS, tuberculosis, and malaria), potentially leading to millions of preventable deaths (Park, 2026).

- **Economic instability:** World leaders point out that global health security is tied to economic stability. When a population's health fails, its economy follows. Sick people cannot work, and poor nations fall deeper into financial ruin. This desperation breeds instability, leading to war and mass migration that no longer stays confined within one country's borders, but threatens global security. Political decay, fueled by health crises, creates a dangerous feedback loop: as foreign institutions crumble, the resulting spread of disease eventually reaches and impacts the United States (Park, 2026).

In short, public health leaders see that withdrawing from the WHO doesn't just hurt the world; it leaves the United States more vulnerable to disease, less competitive in the global economy, and isolated from the vital data we need to keep Americans safe (John Hopkins Bloomberg School of Public Health, 2025).

> To ponder: The U.S. withdrawal from the World Health Organization (WHO) will undoubtedly reshape global public health. Many experts contend that the U.S. will eventually face domestic repercussions due to the restrictive nature of its exclusion from the international body. While the exact timing and nature of these consequences remain difficult to forecast, they will likely manifest during future health crises. Ultimately, was the decision to withdraw from the WHO truly a strategic and wise move?

Reference

Adams D. A, Thomas, K. R, Jajosky, R., et al. Summary of Notifiable Infectious Diseases and Conditions — United States, 2014. MMWR Morb Mortal Wkly Rep 2016;63:1-152 DOI: dx.doi.org/10.15585/mmwr.mm6354a1.

Dall, C. (2025). Trump issues order to withdraw US from WHO. University of Minnesota www.cidrap.umn.edu

Emanuel, G. & Lambert, J. (2026). The divorce between the U.S. and WHO is final this week. Or is it? NPR www.npr.org

John Hopkins Bloomberg School of Public Health. (2025). The U.S. and the WHO: An imperfect but essential relationship. John Hopkins Bloomberg School of Public Health www.publichealth.jhu.edu

Hart, D. (2025). Trump Administration rejects 'Ill-Advised' WHO pandemic regs. The Washington Stand www.washingtonstand.com

Infectious Diseases Society of America. (2026). Statement on U.S. withdrawal from WHO. Infectious Diseases Society of America www.idsociety.org

Ogbu, U. C., & Arah, O. A. (2016). World Health Organization. International Encyclopedia of Public Health. doi: 10.1016/B978-0-12-803678-5.00499-9

Park, A. (2026). The U.S. has pulled out of the WHO. Here's what that means for public health. Time www.time.com

Thomas, L. (2024). The role of WHO guidelines in shaping global health policies. Medical Life Science News www.news-medical.net

Travers, E. (2025). What is the World Health Organization, and why does it matter? United Nations www.news.un.org

World Health Organization. (2025). Essential Public Health Functions. WHO www.paho.org

World Health Organization. (2026). How WHO is funded. WHO www.who.int

World Health Organization. (2026). What we do. WHO www.who.int

The White House. (2025). Withdrawing the United States from the World Health Organization. The White House www.whitehouse.gov

Yazdi-Feyzabadi, V., Haghdoost, A.A., McKee, M., Takian, A., Bradley, E., Brugha, R., Eyal, N., Eybpoosh, S., Gostin, L., Ikegami, N., Kickbusch, I., Labonté, R., Mannion, R., Norheim, O.F., Shiffman, J., & Karamouzian, M. (2025). The United States Withdrawal From the World Health Organization: Implications and Challenges. International journal of health policy and management. 14:9086. doi: 10.34172/ijhpm.9086

This page titled 10.3: The World Health Organization is shared under a CC BY 4.0 license and was authored, remixed, and/or curated by Fabiane Morales.

INDEX

A

Administrative Law
5.4: Types of Law

adolescent health
4.5: Prevalent Health Concerns through the Life Phases

adolescents
4.5.2: Adolescent and Adulthood

adult health
4.5: Prevalent Health Concerns through the Life Phases

advocacy
2.9.3: Program Planning - Implementing an Intervention

Affordable Care Act
9.3: Healthcare Systems
9.3.4: Uninsured and Underinsured

aging
4.5: Prevalent Health Concerns through the Life Phases

air quality
8.1: Issues in Environmental Health

allied health practitioners
9.1: Health Professionals

altered environment
8.2: Unaltered, Altered, and Built Environments

altered environments
8: Environmental Health and Safety

Alzheimer's disease
6.1: Non-Communicable Diseases and Public Health
6.5: Research

antibiotic resistance
7.6: Tools of Public Health- Treatment

antibiotics
7.6: Tools of Public Health- Treatment

antivirals
7.6: Tools of Public Health- Treatment

artificial intelligence
3.4.1: Internet, Social Media, and the Age of Algorithm

assessment
10.1: Essential Public Health Services

Association
2.5: Types of Population Studies

assurance
10.1: Essential Public Health Services

B

bacterial infections
7.6: Tools of Public Health- Treatment

barrier prevention
7.3: Tools of Public Health- Barrier

behavior change theories
2.9.3: Program Planning - Implementing an Intervention

behavioral change
4: Public Health and Behavioral Science

behavioral change models
4.3: Behavioral Change Models and Theories

behavioral determinants
1.7: Social Determinants of Health

behavioral economics
4.4: Influence of Change Health Behavior

behavioral health
4.5.2: Adolescent and Adulthood

behavioral sciences
4: Public Health and Behavioral Science

Bill of Rights
5.2: Police Power

bioethics
5.1: Bioethics

biological plausibility
2.8: Etiology and Contributory Cause

BRCA mutation
6.4: Genetic Testing

breast cancer
6.4: Genetic Testing

built environment
8.2: Unaltered, Altered, and Built Environments

built environments
8: Environmental Health and Safety

burden of disease
2.2: Burden of Disease and Epidemiology

C

cancer
6.1: Non-Communicable Diseases and Public Health
6.2: Screening

cancer risk
8.4: Multiplicative Interaction

cap
9.3.1: Health Insurance Terms

capacity building
2.9.3: Program Planning - Implementing an Intervention

causality
2.8: Etiology and Contributory Cause

Causation
2.5: Types of Population Studies
2.6: Observational Studies

cause and effect
2.7: Experimental Studies

CDC
3.1: Where do Public Health Data Come From?

chemicals
8.2: Unaltered, Altered, and Built Environments

childhood health
4.5.1: Maternal, Infant and Child

childhood vaccinations
7.2: Endemic, Epidemic, and Pandemic

cholera
3.2: Public Health Surveillance

chronic disease
6.4: Genetic Testing

chronic disease prevention
6.3: Interventions

chronic diseases
1.4: Approaches to Protect and Promote Health
2.2: Burden of Disease and Epidemiology
3.5: Measuring the Health of a Population
4.5: Prevalent Health Concerns through the Life Phases
6.1: Non-Communicable Diseases and Public Health
6.5: Research
8: Environmental Health and Safety

chronic health conditions
1.2: History of Public Health

cigarette smoke
8.4: Multiplicative Interaction

civil liberties
5.2: Police Power

classical conditioning
4.3: Behavioral Change Models and Theories

climate change
8.1: Issues in Environmental Health

clinical psychologists
9.1: Health Professionals

clinical trials
2.5: Types of Population Studies
2.7: Experimental Studies

cognitive biases
3.4.1: Internet, Social Media, and the Age of Algorithm

cohort studies
2.6: Observational Studies
2.8: Etiology and Contributory Cause
2.9.3.1: Recommendations

coinsurance
9.3.1: Health Insurance Terms

collaborative approach
5.3: Health Policy

colon cancer
6.2: Screening

communicable diseases
7: Communicable Diseases
7.1: Communicable Diseases and Public Health
7.2: Endemic, Epidemic, and Pandemic
7.3: Tools of Public Health- Barrier
7.5: Tools of Public Health- Immunization
7.6: Tools of Public Health- Treatment

Community Engagement
3.4.2: Credible Sources

community health
1: What is Public Health?
1.1: What Exactly is Public Health?
1.2: History of Public Health
1.4: Approaches to Protect and Promote Health
1.7: Social Determinants of Health
10.1: Essential Public Health Services
2.9: Program Planning
2.9.1: Program Planning - Needs Assessment
2.9.2: Program Planning - Goals and Objectives
2.9.3: Program Planning - Implementing an Intervention
3.2: Public Health Surveillance
4: Public Health and Behavioral Science
4.4: Influence of Change Health Behavior
4.5: Prevalent Health Concerns through the Life Phases
5.3: Health Policy
7.3: Tools of Public Health- Barrier

community health centers
9.2: Healthcare Institutions
community intervention
2.9.3: Program Planning - Implementing an Intervention
community mobilization
10.2: U.S. Public Health Agencies
compatibility
4.3.10: Diffusion of Innovation
complexity
4.3.10: Diffusion of Innovation
components of health
1.3: Public Health vs Personal Health
Constitution
5.2: Police Power
Constitutional Law
5.4: Types of Law
contact tracing
3.3: Notifiable Diseases
7.4: Tools of Public Health- Screening
Contributory cause
2.8: Etiology and Contributory Cause
control efforts
7.2: Endemic, Epidemic, and Pandemic
control groups
2.7: Experimental Studies
copayment
9.3.1: Health Insurance Terms
core functions
10.1: Essential Public Health Services
county health agencies
10: Public Health Institutions and Systems
coverage
9.3.2: Governmental System
culture
4.2: The Relation between Social Systems and Health

D

data collection
2.9.1: Program Planning - Needs Assessment
decision making
3.4.1: Internet, Social Media, and the Age of Algorithm
4.4: Influence of Change Health Behavior
Declaration of Independence
5.2: Police Power
deductible
9.3.1: Health Insurance Terms
dementia
6.5: Research
dentists
9.1: Health Professionals
determinants of health
1.3: Public Health vs Personal Health
1.7: Social Determinants of Health
diabetes
6.1: Non-Communicable Diseases and Public Health
diagnostic test
6.2: Screening
diffusion of innovation
4.3.10: Diffusion of Innovation
disease
6.2: Screening
7.7: How can elimination or eradication be attained?
disease assessment
2.2: Burden of Disease and Epidemiology
disease burden
7.5: Tools of Public Health- Immunization
disease classification
10.3: The World Health Organization
disease control
7.4: Tools of Public Health- Screening
disease distribution
2.2: Burden of Disease and Epidemiology
disease eradication
7.5: Tools of Public Health- Immunization
disease outbreaks
7.2: Endemic, Epidemic, and Pandemic
disease prevalence
6: Non-Communicable Diseases
disease prevention
1: What is Public Health?
1.1: What Exactly is Public Health?
1.2: History of Public Health
10: Public Health Institutions and Systems
10.2: U.S. Public Health Agencies
3.3: Notifiable Diseases
7.6: Tools of Public Health- Treatment
8.1: Issues in Environmental Health
Disease surveillance
3.1: Where do Public Health Data Come From?
3.2: Public Health Surveillance
disease tracking
3.3: Notifiable Diseases
disease transmission
7.3: Tools of Public Health- Barrier
disinformation
3.4: Quality of Health Information
drug overdose
8.5: Safety
drug use prevention
2.9.3.2: Primary, Secondary and Tertiary Intervention
Due Process Clauses
5.2: Police Power

E

early detection
6.2: Screening
6.4: Genetic Testing
Ebola
5.5: Pandemic Response
ebola pandemic
5.5: Pandemic Response
ecological risk assessment
8.3: Risk Assessments
ecological studies
2.6: Observational Studies
economic impacts
7.8: Pandemic Prevention
economic policy
5.2: Police Power
effectiveness
2.9.4: Program Planning - Evaluation
efficacy
2.9: Program Planning
Elderly
6.1: Non-Communicable Diseases and Public Health
6.5: Research
eligibility
9.3.2: Governmental System
eliminate
7.7: How can elimination or eradication be attained?
emergency response
10.2: U.S. Public Health Agencies
emerging threats
10.1: Essential Public Health Services
emotional health
4.5.2: Adolescent and Adulthood
endemic
7.2: Endemic, Epidemic, and Pandemic
engagement
3.4.1: Internet, Social Media, and the Age of Algorithm
environment
8.1: Issues in Environmental Health
environmental health
1.3: Public Health vs Personal Health
8: Environmental Health and Safety
8.1: Issues in Environmental Health
8.3: Risk Assessments
8.4: Multiplicative Interaction
epidemic
7: Communicable Diseases
7.2: Endemic, Epidemic, and Pandemic
epidemiological transition
6: Non-Communicable Diseases
epidemiology
1.1: What Exactly is Public Health?
1.2: History of Public Health
2.2: Burden of Disease and Epidemiology
2.6: Observational Studies
2.8: Etiology and Contributory Cause
2.9.5: P.E.R.I.E. Process
3.1: Where do Public Health Data Come From?
3.2: Public Health Surveillance
3.3: Notifiable Diseases
7.1: Communicable Diseases and Public Health
8.4: Multiplicative Interaction
equitable access
10.2: U.S. Public Health Agencies
eradicate
7.7: How can elimination or eradication be attained?
eradication
7.7: How can elimination or eradication be attained?
ethical dilemmas
5.1: Bioethics
ethnic equity
2.4: Health Disparities and Inequalities
etiology
2.8: Etiology and Contributory Cause
evaluation
2: Evidence-Based Public Health
2.9.4: Program Planning - Evaluation
2.9.5: P.E.R.I.E. Process
experimental research
2.7: Experimental Studies
experimental studies
2.5: Types of Population Studies
exposure assessment
8.3: Risk Assessments

F

family planning
4.5.1: Maternal, Infant and Child

FDA
3.4.2: Credible Sources

feasibility testing
2.7: Experimental Studies

federal agencies
10: Public Health Institutions and Systems

federal government
10.2: U.S. Public Health Agencies
10.2.1: Federal Agencies

financial protection
9.3.4: Uninsured and Underinsured

food safety
1: What is Public Health?

Food Security
6: Non-Communicable Diseases

formative evaluation
2.9.4: Program Planning - Evaluation

freedom rights
5.2: Police Power

G

gene modification
5.1: Bioethics

genetic testing
6.4: Genetic Testing

global health
10.3: The World Health Organization
7.7: How can elimination or eradication be attained?

global health security
5.5: Pandemic Response
7: Communicable Diseases

goals and objectives
2.9: Program Planning

government
9.3.2: Governmental System

government agencies
10: Public Health Institutions and Systems
3.4.2: Credible Sources

government regulations
5.4: Types of Law

governmental system
9: Health Professionals and Healthcare Systems

grant funding
2.9: Program Planning

grassroots organizing
2.9.3: Program Planning - Implementing an Intervention

H

handwashing
7.3: Tools of Public Health- Barrier

hazard identification
8.3: Risk Assessments

health
4.5.2: Adolescent and Adulthood
8.1: Issues in Environmental Health
8.2: Unaltered, Altered, and Built Environments

health behavior
4.2: The Relation between Social Systems and Health
4.4: Influence of Change Health Behavior

health behaviors
3.4: Quality of Health Information
4.3: Behavioral Change Models and Theories

health benefits
9.3.4: Uninsured and Underinsured

health care
5.1: Bioethics

health communication
3.4: Quality of Health Information
3.4.1: Internet, Social Media, and the Age of Algorithm

health concerns
4: Public Health and Behavioral Science

health consequences
7.8: Pandemic Prevention

health coverage
9.3: Healthcare Systems

health data
3.2: Public Health Surveillance

health data management
10.2.1: Federal Agencies

health decisions
3.4.1: Internet, Social Media, and the Age of Algorithm

health determinants
8: Environmental Health and Safety

health disparities
1.2: History of Public Health
1.4: Approaches to Protect and Promote Health
1.7: Social Determinants of Health
10.1: Essential Public Health Services
2: Evidence-Based Public Health
2.4: Health Disparities and Inequalities
2.5: Types of Population Studies
2.9.3: Program Planning - Implementing an Intervention
4.2: The Relation between Social Systems and Health
4.5.1: Maternal, Infant and Child
5.1: Bioethics
8.1: Issues in Environmental Health

health education
1: What is Public Health?
3.4: Quality of Health Information
3.4.2: Credible Sources

health equality
1.4: Approaches to Protect and Promote Health

health equity
1.4: Approaches to Protect and Promote Health
1.7: Social Determinants of Health
10.3: The World Health Organization
5.3: Health Policy
6.3: Interventions

health hazards
8: Environmental Health and Safety

Health in All Policies
5.3: Health Policy

health inequalities
2.4: Health Disparities and Inequalities

health inequities
2.2: Burden of Disease and Epidemiology
6: Non-Communicable Diseases

health information
3.4.1: Internet, Social Media, and the Age of Algorithm

health insurance
9.3: Healthcare Systems
9.3.3: Employer-based Systems

health insurance terms
9: Health Professionals and Healthcare Systems

health intervention
2.9: Program Planning

health interventions
2.5: Types of Population Studies
2.9.1: Program Planning - Needs Assessment

health legislation
5.4: Types of Law

health misinformation
3.4.2: Credible Sources

health models
4: Public Health and Behavioral Science

health outcomes
1: What is Public Health?
1.4: Approaches to Protect and Promote Health
1.7: Social Determinants of Health
2.2: Burden of Disease and Epidemiology
2.5: Types of Population Studies
2.6: Observational Studies
4.2: The Relation between Social Systems and Health
4.3.10: Diffusion of Innovation
4.4: Influence of Change Health Behavior
6.4: Genetic Testing

health policies
5.3: Health Policy

health policy
5.5: Pandemic Response
6.5: Research
7.7: How can elimination or eradication be attained?
8.4: Multiplicative Interaction

health problems
2.9.5: P.E.R.I.E. Process

health professionals
9: Health Professionals and Healthcare Systems
9.1: Health Professionals

health promotion
1.1: What Exactly is Public Health?

health regulations
10.3: The World Health Organization

health risk factors
2.9.1: Program Planning - Needs Assessment

health risks
8.4: Multiplicative Interaction

health savings accounts
9.3.1: Health Insurance Terms

health status
10.1: Essential Public Health Services
3.5: Measuring the Health of a Population

health systems
10.3: The World Health Organization

health theories
4: Public Health and Behavioral Science

health threats
10.3: The World Health Organization
5.4: Types of Law

healthcare
1.3: Public Health vs Personal Health
3.5: Measuring the Health of a Population
7.6: Tools of Public Health- Treatment
9.2: Healthcare Institutions
9.3.2: Governmental System

healthcare access
1.1: What Exactly is Public Health?
2.4: Health Disparities and Inequalities

healthcare costs
6.1: Non-Communicable Diseases and Public Health
9.3: Healthcare Systems
9.3.4: Uninsured and Underinsured
healthcare disparities
9.3.4: Uninsured and Underinsured
healthcare funding
10.2.1: Federal Agencies
healthcare industry
9.1: Health Professionals
healthcare institutions
9: Health Professionals and Healthcare Systems
healthcare intervention
2.9.3.1: Recommendations
healthcare providers
9.3.3: Employer-based Systems
healthcare quality
9.2: Healthcare Institutions
healthcare services
2: Evidence-Based Public Health
healthcare spending
9.3: Healthcare Systems
healthcare systems
4.1: The Relation between Public Health and Social and Behavioral Sciences
9: Health Professionals and Healthcare Systems
healthy behaviors
4.3.10: Diffusion of Innovation
healthy living conditions
8: Environmental Health and Safety
Healthy People Initiative
1.6: The Healthy People Initiative 1990-2030
heart disease
6.1: Non-Communicable Diseases and Public Health
6.2: Screening
heart health
6.3: Interventions
herd immunity
7.5: Tools of Public Health- Immunization
high deductible health plans
9.3.1: Health Insurance Terms
History of Public Health
1.2: History of Public Health
HIV
7.1: Communicable Diseases and Public Health
7.6: Tools of Public Health- Treatment
HMO
9.3.3: Employer-based Systems
hospice care
9.2: Healthcare Institutions
hospitals
9.2: Healthcare Institutions

I

immune system
7.6: Tools of Public Health- Treatment
immunization
7: Communicable Diseases
7.5: Tools of Public Health- Immunization
impact evaluation
2.9.4: Program Planning - Evaluation
Implementation
2.9.5: P.E.R.I.E. Process
Incidence rate
2.3: Vital Statistics
incidence rates
7.1: Communicable Diseases and Public Health
income
9.3.2: Governmental System
indemnity plans
9.3.1: Health Insurance Terms
individual immunity
7.5: Tools of Public Health- Immunization
individual rights
5.2: Police Power
inequalities
4.1: The Relation between Public Health and Social and Behavioral Sciences
infant health
4.5: Prevalent Health Concerns through the Life Phases
4.5.1: Maternal, Infant and Child
infant mortality
3.5: Measuring the Health of a Population
infection visibility
7.7: How can elimination or eradication be attained?
infectious diseases
1.2: History of Public Health
1.4: Approaches to Protect and Promote Health
2.2: Burden of Disease and Epidemiology
3.3: Notifiable Diseases
3.5: Measuring the Health of a Population
4.5: Prevalent Health Concerns through the Life Phases
7: Communicable Diseases
7.4: Tools of Public Health- Screening
influenza
3.2: Public Health Surveillance
influenza pandemic
5.5: Pandemic Response
informed consent
5.1: Bioethics
injuries
8.5: Safety
injury prevention
8.5: Safety
innovation theory
4.3.10: Diffusion of Innovation
inpatient facilities
9.2: Healthcare Institutions
Institutional Review Board (IRB)
5.1: Bioethics
insurance
9.3.2: Governmental System
insurance coverage
9.3.3: Employer-based Systems
9.3.4: Uninsured and Underinsured
intentional injuries
8.5: Safety
international health regulations
5.5: Pandemic Response
international response
10.3: The World Health Organization
interpersonal factors
4.3: Behavioral Change Models and Theories
intersectoral collaboration
5.3: Health Policy
intervention
2: Evidence-Based Public Health
2.9.4: Program Planning - Evaluation
2.9.5: P.E.R.I.E. Process
intervention implementation
2.9: Program Planning
intervention planning
2.9.2: Program Planning - Goals and Objectives
intervention studies
2.7: Experimental Studies
interventions
2.9.3.2: Primary, Secondary and Tertiary Intervention
6: Non-Communicable Diseases
isolation
7.3: Tools of Public Health- Barrier
7.8: Pandemic Prevention

J

Judicial Law
5.4: Types of Law

L

laboratory tests
7.4: Tools of Public Health- Screening
lead exposure
8.3: Risk Assessments
leading causes of death
3.5: Measuring the Health of a Population
Legislative Law
5.4: Types of Law
levels of care
9: Health Professionals and Healthcare Systems
life expectancy
3.5: Measuring the Health of a Population
8: Environmental Health and Safety
lifestyle changes
6.3: Interventions
lifestyle factors
4.2: The Relation between Social Systems and Health
local government
10.2: U.S. Public Health Agencies
lockdowns
7.8: Pandemic Prevention
loss aversion
4.4: Influence of Change Health Behavior
lung cancer
8.4: Multiplicative Interaction

M

malaria
7.1: Communicable Diseases and Public Health
managed care organizations
9.3.1: Health Insurance Terms
masks
7.3: Tools of Public Health- Barrier
mass screening
7.4: Tools of Public Health- Screening
maternal health
4: Public Health and Behavioral Science
4.5: Prevalent Health Concerns through the Life Phases
4.5.1: Maternal, Infant and Child

maternal mortality
4.5.1: Maternal, Infant and Child

measurable outcomes
2.9.2: Program Planning - Goals and Objectives

media literacy
3.4.1: Internet, Social Media, and the Age of Algorithm

Medicaid
10.2.1: Federal Agencies
9.3: Healthcare Systems
9.3.2: Governmental System
9.3.4: Uninsured and Underinsured

medical ethics
5.1: Bioethics

Medicare
10.2.1: Federal Agencies
9.3: Healthcare Systems
9.3.2: Governmental System

mental health
1.1: What Exactly is Public Health?
4.5.2: Adolescent and Adulthood
7.8: Pandemic Prevention

minority health
2.4: Health Disparities and Inequalities

misinformation
3.4: Quality of Health Information
3.4.1: Internet, Social Media, and the Age of Algorithm

Morbidity
2.3: Vital Statistics

Mortality
2.3: Vital Statistics
8.5: Safety

mRNA vaccines
7.5: Tools of Public Health- Immunization

multiple risk factor reduction
6.3: Interventions

N

natural environment
8.2: Unaltered, Altered, and Built Environments

NCHS
3.1: Where do Public Health Data Come From?

needs assessment
2: Evidence-Based Public Health
2.9: Program Planning
2.9.1: Program Planning - Needs Assessment

net benefit
2.9.3.1: Recommendations

NIH
3.1: Where do Public Health Data Come From?

NNDSS
3.3: Notifiable Diseases

notifiable diseases
3.1: Where do Public Health Data Come From?

Nuremberg Code
5.1: Bioethics

nurses
9.1: Health Professionals

nutrition
1.1: What Exactly is Public Health?
3.5: Measuring the Health of a Population
4: Public Health and Behavioral Science
4.5.2: Adolescent and Adulthood

O

Objective evidence
2.1: What Does "Evidence-Based Practice" Mean?

observational studies
2.5: Types of Population Studies
2.6: Observational Studies

one health
5.5: Pandemic Response

opioid addiction
2.9.5: P.E.R.I.E. Process

opioid crisis
2.9.3.2: Primary, Secondary and Tertiary Intervention
6.3: Interventions

optometrists
9.1: Health Professionals

outbreak control
7.1: Communicable Diseases and Public Health

outbreak response
3.2: Public Health Surveillance
3.3: Notifiable Diseases

outcome evaluation
2.9.4: Program Planning - Evaluation

outpatient facilities
9.2: Healthcare Institutions

P

P.E.R.I.E.
2.9.5: P.E.R.I.E. Process

pandemic
10.3: The World Health Organization
7: Communicable Diseases
7.2: Endemic, Epidemic, and Pandemic

pandemic prevention
7.8: Pandemic Prevention

pandemics
7.8: Pandemic Prevention

pathogen characteristics
7.7: How can elimination or eradication be attained?

personal health
1.3: Public Health vs Personal Health

personalized medicine
6.4: Genetic Testing

pharmacists
9.1: Health Professionals

physical activity
4.2: The Relation between Social Systems and Health
6: Non-Communicable Diseases

physical environment
8.2: Unaltered, Altered, and Built Environments

physical health
1.3: Public Health vs Personal Health

physicians
9.1: Health Professionals

pilot study
2.7: Experimental Studies

point of service plans
9.3.3: Employer-based Systems

Police Power
5.2: Police Power

policies
10.2.1: Federal Agencies
2: Evidence-Based Public Health

policy
5.4: Types of Law

policy development
10.1: Essential Public Health Services

policymaking
5.3: Health Policy

political impacts
7.8: Pandemic Prevention

pollution
8.1: Issues in Environmental Health
8.2: Unaltered, Altered, and Built Environments

population comparison studies
2.5: Types of Population Studies

population health
1.7: Social Determinants of Health
10: Public Health Institutions and Systems
3.5: Measuring the Health of a Population
4.1: The Relation between Public Health and Social and Behavioral Sciences
4.3.10: Diffusion of Innovation
6.3: Interventions
6.5: Research

population studies
2: Evidence-Based Public Health

POS
9.3.3: Employer-based Systems

power of default
4.4: Influence of Change Health Behavior

PPO
9.3.3: Employer-based Systems

precision medicine
6.4: Genetic Testing

preferred provider organizations
9.3.3: Employer-based Systems

pregnancy complications
4.5.1: Maternal, Infant and Child

premium
9.3.1: Health Insurance Terms

premium costs
9.3.3: Employer-based Systems

premium increases
9.3.4: Uninsured and Underinsured

prenatal care
4.5.1: Maternal, Infant and Child

prevalence
2.6: Observational Studies

Prevalence rate
2.3: Vital Statistics

prevention strategies
7.1: Communicable Diseases and Public Health

preventive measures
2.5: Types of Population Studies

primary data
2.9.1: Program Planning - Needs Assessment

primary intervention
2.9.3.2: Primary, Secondary and Tertiary Intervention

prognosis
6.2: Screening

Protective factor
1.5: Risk Factors and Protective Factors

Psychological Health
1.3: Public Health vs Personal Health
4.5.2: Adolescent and Adulthood

psychology
4.1: The Relation between Public Health and Social and Behavioral Sciences
public education
8.5: Safety
public health assessment
8.3: Risk Assessments
public health emergencies
5.5: Pandemic Response
public health infrastructure
10.2.1: Federal Agencies
public health interventions
4.1: The Relation between Public Health and Social and Behavioral Sciences
public health law
5.4: Types of Law
public health messaging
3.4: Quality of Health Information
public health policy
1.1: What Exactly is Public Health?
2.5: Types of Population Studies
5.4: Types of Law
public health services
10.1: Essential Public Health Services
10.2.1: Federal Agencies
public health surveillance
3.2: Public Health Surveillance
public policy
4.1: The Relation between Public Health and Social and Behavioral Sciences
punishment
4.3: Behavioral Change Models and Theories

Q

quality assessment
9.2: Healthcare Institutions
quality of evidence
2.9.3.1: Recommendations
quarantine
7.3: Tools of Public Health- Barrier

R

racial equity
2.4: Health Disparities and Inequalities
radiation
8.2: Unaltered, Altered, and Built Environments
radon
8.4: Multiplicative Interaction
randomized controlled trials
2.7: Experimental Studies
2.8: Etiology and Contributory Cause
2.9.3.1: Recommendations
Recommendations
2.9.3.1: Recommendations
2.9.3.2: Primary, Secondary and Tertiary Intervention
2.9.5: P.E.R.I.E. Process
regulatory standards
10.2.1: Federal Agencies
rehabilitation
9.2: Healthcare Institutions
reinforcement
4.3: Behavioral Change Models and Theories
relative advantage
4.3.10: Diffusion of Innovation
religion
4.2: The Relation between Social Systems and Health
Reportable diseases
2.3: Vital Statistics
reproductive health
4.5: Prevalent Health Concerns through the Life Phases
reproductive healthcare
4.5.1: Maternal, Infant and Child
research
6.5: Research
research ethics
5.1: Bioethics
research methods
3.4.2: Credible Sources
risk assessment
8.3: Risk Assessments
8.4: Multiplicative Interaction
risk assessments
8: Environmental Health and Safety
risk characterization
8.3: Risk Assessments
Risk factor
1.5: Risk Factors and Protective Factors
risk factors
2.2: Burden of Disease and Epidemiology
2.6: Observational Studies
6.1: Non-Communicable Diseases and Public Health
6.5: Research
7.2: Endemic, Epidemic, and Pandemic

S

safety
8.2: Unaltered, Altered, and Built Environments
sanitation
1.2: History of Public Health
scientific consensus
3.4.2: Credible Sources
screening
6.2: Screening
7: Communicable Diseases
7.4: Tools of Public Health- Screening
secondary data
2.9.1: Program Planning - Needs Assessment
secondary intervention
2.9.3.2: Primary, Secondary and Tertiary Intervention
selective screening
7.4: Tools of Public Health- Screening
SMART criteria
2.9.2: Program Planning - Goals and Objectives
smoking bans
5.3: Health Policy
smoking cessation
6.3: Interventions
social determinants
1.4: Approaches to Protect and Promote Health
1.7: Social Determinants of Health
social determinants of health
1.1: What Exactly is Public Health?
1.6: The Healthy People Initiative 1990-2030
2.4: Health Disparities and Inequalities
social health
1.3: Public Health vs Personal Health
social impacts
7.8: Pandemic Prevention
social justice
4.1: The Relation between Public Health and Social and Behavioral Sciences
social marketing
4.4: Influence of Change Health Behavior
social media
3.4.1: Internet, Social Media, and the Age of Algorithm
social norms
4.3: Behavioral Change Models and Theories
social sciences
4: Public Health and Behavioral Science
4.1: The Relation between Public Health and Social and Behavioral Sciences
social systems
4.2: The Relation between Social Systems and Health
socioeconomic factors
2.4: Health Disparities and Inequalities
socioeconomic status
1.7: Social Determinants of Health
4.2: The Relation between Social Systems and Health
sociology
4.1: The Relation between Public Health and Social and Behavioral Sciences
specific objectives
2.9.2: Program Planning - Goals and Objectives
state government
10.2: U.S. Public Health Agencies
state health agencies
10: Public Health Institutions and Systems
statistics
3.1: Where do Public Health Data Come From?
strength of recommendation
2.9.3.1: Recommendations
strength of relationship
2.8: Etiology and Contributory Cause
stroke
6.1: Non-Communicable Diseases and Public Health
structural racism
2.4: Health Disparities and Inequalities
Subjective evidence
2.1: What Does “Evidence-Based Practice” Mean?
substance abuse
4.5.2: Adolescent and Adulthood
summative evaluation
2.9.4: Program Planning - Evaluation
surveillance
10.2: U.S. Public Health Agencies
surveillance system
3.3: Notifiable Diseases
systemic racism
2.4: Health Disparities and Inequalities

T

target population
2.9.2: Program Planning - Goals and Objectives
targeted therapies
6.4: Genetic Testing
technology adoption
4.3.10: Diffusion of Innovation

tertiary intervention
2.9.3.2: Primary, Secondary and Tertiary Intervention
timely reminders
4.4: Influence of Change Health Behavior
tobacco regulations
5.3: Health Policy
tobacco taxation
6: Non-Communicable Diseases
toxicity
8.3: Risk Assessments
traffic laws
8.5: Safety
transmission
7.7: How can elimination or eradication be attained?
treatment
7: Communicable Diseases
trust in science
3.4: Quality of Health Information
tuberculosis
7.1: Communicable Diseases and Public Health
Tuskegee Syphilis Study
5.1: Bioethics
Typhoid Mary
5.2: Police Power

U

U.S. public health agencies
10: Public Health Institutions and Systems
U.S. withdrawal from the WHO
10.3: The World Health Organization
unaltered environment
8.2: Unaltered, Altered, and Built Environments
underinsured
9: Health Professionals and Healthcare Systems
9.3.4: Uninsured and Underinsured
uninsured
9: Health Professionals and Healthcare Systems
9.3.4: Uninsured and Underinsured
uninsured population
9.3: Healthcare Systems
unintentional injuries
8.5: Safety
United States
5.2: Police Power
urban planning
6: Non-Communicable Diseases
US healthcare
9.3: Healthcare Systems

V

vaccination
1.2: History of Public Health
7.7: How can elimination or eradication be attained?
vaccine hesitancy
3.4: Quality of Health Information
vaccines
1: What is Public Health?
7.5: Tools of Public Health- Immunization
viral vector vaccines
7.5: Tools of Public Health- Immunization
vital statistics
3.1: Where do Public Health Data Come From?
vulnerable groups
10.2.1: Federal Agencies
vulnerable populations
1.4: Approaches to Protect and Promote Health
8.1: Issues in Environmental Health

W

water quality
1: What is Public Health?
wellness education
10.2: U.S. Public Health Agencies
WHO
10.3: The World Health Organization
3.4.2: Credible Sources
WHO Budget
10.3: The World Health Organization
World Health Organization
10: Public Health Institutions and Systems
10.3: The World Health Organization
5.5: Pandemic Response

Y

young adults
4.5.2: Adolescent and Adulthood

This page titled Index is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

GLOSSARY

S

Sample Word 1 | Sample Definition 1

This page titled Glossary is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.

DETAILED LICENSING

Overview

Title: Introduction to Public Health (Morales)

Webpages: 112

Applicable Restrictions: Noncommercial

All licenses found:

- Undeclared: 54.5% (61 pages)
- CC BY-NC-SA 4.0: 22.3% (25 pages)
- CC BY 4.0: 18.8% (21 pages)
- Public Domain: 4.5% (5 pages)

By Page

- Introduction to Public Health (Morales) - *Undeclared*
  - Front Matter - *Undeclared*
    - TitlePage - *Undeclared*
    - InfoPage - *Undeclared*
    - Preface and Acknowledgments - *Undeclared*
    - Table of Contents - *Undeclared*
    - Licensing - *Undeclared*
  - 1: What is Public Health? - *Public Domain*
    - 1.1: What Exactly is Public Health? - *Public Domain*
    - 1.2: History of Public Health - *Public Domain*
    - 1.3: Public Health vs Personal Health - *Public Domain*
    - 1.4: Approaches to Protect and Promote Health - *Public Domain*
    - 1.5: Risk Factors and Protective Factors - *CC BY-NC-SA 4.0*
    - 1.6: The Healthy People Initiative 1990-2030 - *CC BY 4.0*
    - 1.7: Social Determinants of Health - *CC BY-NC-SA 4.0*
  - 2: Evidence-Based Public Health - *CC BY-NC-SA 4.0*
    - 2.1: What Does "Evidence-Based Practice" Mean? - *CC BY-NC-SA 4.0*
    - 2.2: Burden of Disease and Epidemiology - *CC BY-NC-SA 4.0*
    - 2.3: Vital Statistics - *CC BY-NC-SA 4.0*
    - 2.4: Health Disparities and Inequalities - *CC BY-NC-SA 4.0*
    - 2.5: Types of Population Studies - *CC BY-NC-SA 4.0*
    - 2.6: Observational Studies - *CC BY-NC-SA 4.0*
    - 2.7: Experimental Studies - *CC BY-NC-SA 4.0*
    - 2.8: Etiology and Contributory Cause - *CC BY-NC-SA 4.0*
    - 2.9: Program Planning - *CC BY-NC-SA 4.0*
      - 2.9.1: Program Planning - Needs Assessment - *CC BY-NC-SA 4.0*
      - 2.9.2: Program Planning - Goals and Objectives - *CC BY-NC-SA 4.0*
      - 2.9.3: Program Planning - Implementing an Intervention - *CC BY-NC-SA 4.0*
        - 2.9.3.1: Recommendations - *CC BY-NC-SA 4.0*
        - 2.9.3.2: Primary, Secondary and Tertiary Intervention - *CC BY-NC-SA 4.0*
      - 2.9.4: Program Planning - Evaluation - *CC BY-NC-SA 4.0*
      - 2.9.5: P.E.R.I.E. Process - *CC BY-NC-SA 4.0*
  - 3: Data and Communication - *CC BY-NC-SA 4.0*
    - 3.1: Where do Public Health Data Come From? - *Undeclared*
    - 3.2: Public Health Surveillance - *Undeclared*
    - 3.3: Notifiable Diseases - *Undeclared*
    - 3.4: Quality of Health Information - *Undeclared*
      - 3.4.1: Internet, Social Media, and the Age of Algorithm - *Undeclared*
      - 3.4.2: Credible Sources - *Undeclared*
    - 3.5: Measuring the Health of a Population - *Undeclared*
  - 4: Public Health and Behavioral Science - *Undeclared*
    - 4.1: The Relation between Public Health and Social and Behavioral Sciences - *Undeclared*
    - 4.2: The Relation between Social Systems and Health - *Undeclared*
    - 4.3: Behavioral Change Models and Theories - *Undeclared*
      - 4.3.1: Theory of Planned Behavior - *CC BY 4.0*
      - 4.3.2: Health Belief Model - *CC BY 4.0*

- 4.3.3: Social Cognitive Theory - *CC BY 4.0*
- 4.3.4: Self-Determination Theory - *CC BY 4.0*
- 4.3.5: Transtheoretical Model AKA-Stages of Change - *CC BY 4.0*
- 4.3.6: The Social-Ecological Model - *CC BY 4.0*
- 4.3.7: Community Intervention Models - *CC BY 4.0*
- 4.3.8: Mobilizing Action through Planning and Partnerships (MAPP) - *CC BY 4.0*
- 4.3.9: PRECEDE-PROCEED Model - *CC BY 4.0*
- 4.3.10: Diffusion of Innovation - *Undeclared*
- 4.4: Influence of Change Health Behavior - *Undeclared*
- 4.5: Prevalent Health Concerns through the Life Phases - *Undeclared*
  - 4.5.1: Maternal, Infant and Child - *Undeclared*
  - 4.5.2: Adolescent and Adulthood - *Undeclared*
    - 4.5.2.1: Unintentional Injuries - *CC BY 4.0*
    - 4.5.2.2: Violence - *CC BY 4.0*
    - 4.5.2.3: Drug Abuse and Addiction - *CC BY 4.0*
    - 4.5.2.4: Tobacco Use - *CC BY 4.0*
    - 4.5.2.5: Nutrition - *CC BY 4.0*
    - 4.5.2.6: Physical Activity and Fitness - *CC BY 4.0*
    - 4.5.2.7: Obesity - *CC BY 4.0*
    - 4.5.2.8: Mental Health - *CC BY 4.0*
- 5: Health Law Policy and Ethics - *Undeclared*
  - 5.1: Bioethics - *CC BY-NC-SA 4.0*
  - 5.2: Police Power - *CC BY-NC-SA 4.0*
  - 5.3: Health Policy - *CC BY-NC-SA 4.0*
  - 5.4: Types of Law - *CC BY-NC-SA 4.0*
  - 5.5: Pandemic Response - *CC BY-NC-SA 4.0*
- 6: Non-Communicable Diseases - *Undeclared*
  - 6.1: Non-Communicable Diseases and Public Health - *Undeclared*
  - 6.2: Screening - *Undeclared*
  - 6.3: Interventions - *Undeclared*
  - 6.4: Genetic Testing - *Undeclared*
  - 6.5: Research - *Undeclared*
- 7: Communicable Diseases - *Undeclared*
  - 7.1: Communicable Diseases and Public Health - *Undeclared*
  - 7.2: Endemic, Epidemic, and Pandemic - *Undeclared*
  - 7.3: Tools of Public Health- Barrier - *Undeclared*
  - 7.4: Tools of Public Health- Screening - *Undeclared*
  - 7.5: Tools of Public Health- Immunization - *Undeclared*
  - 7.6: Tools of Public Health- Treatment - *Undeclared*
  - 7.7: How can elimination or eradication be attained? - *Undeclared*
  - 7.8: Pandemic Prevention - *Undeclared*
- 8: Environmental Health and Safety - *Undeclared*
  - 8.1: Issues in Environmental Health - *Undeclared*
  - 8.2: Unaltered, Altered, and Built Environments - *Undeclared*
  - 8.3: Risk Assessments - *Undeclared*
  - 8.4: Multiplicative Interaction - *Undeclared*
  - 8.5: Safety - *Undeclared*
- 9: Health Professionals and Healthcare Systems - *Undeclared*
  - 9.1: Health Professionals - *Undeclared*
  - 9.2: Healthcare Institutions - *Undeclared*
  - 9.3: Healthcare Systems - *Undeclared*
    - 9.3.1: Health Insurance Terms - *Undeclared*
    - 9.3.2: Governmental System - *Undeclared*
    - 9.3.3: Employer-based Systems - *Undeclared*
    - 9.3.4: Uninsured and Underinsured - *Undeclared*
- 10: Public Health Institutions and Systems - *Undeclared*
  - 10.1: Essential Public Health Services - *Undeclared*
  - 10.2: U.S. Public Health Agencies - *Undeclared*
    - 10.2.1: Federal Agencies - *Undeclared*
    - 10.2.2: State and County Health Agencies - *CC BY 4.0*
    - 10.2.3: Quasi-Governmental Organizations - *CC BY 4.0*
  - 10.3: The World Health Organization - *CC BY 4.0*
- Back Matter - *Undeclared*
  - Index - *Undeclared*
  - Glossary - *Undeclared*
  - Detailed Licensing - *Undeclared*

This page titled Introduction to Public Health (Morales) is shared under a license and was authored, remixed, and/or curated by Fabiane Morales.