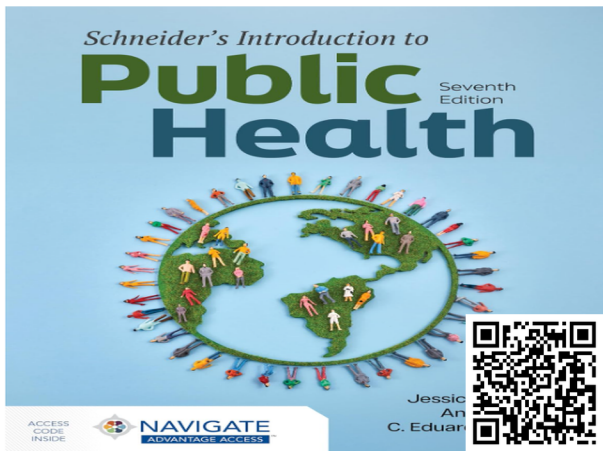


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Schneider's Introduction to

Public Health

Seventh
Edition



Jessica S. Kruger | Andy Moralez | C. Eduardo Siqueira



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Schneider's Introduction to

Public Health

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Edition

Jessica S. Kruger, PhD, MCHES

Director, Teaching Innovation and Excellence

Clinical Associate Professor, Department of Community Health and Health Behavior

School of Public Health and Health Professions

University at Buffalo

Buffalo, New York

Andy Moralez, PhD, MPH, CHES

C. Eduardo Siqueira, ScD, MD, MPH

Professor Emeritus, Environment and Public Health, School for the Environment

University of Massachusetts

Boston, Massachusetts



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World Headquarters
Jones & Bartlett Learning
25 Mall Road
Burlington, MA 01803
978-443-5000
info@jblearning.com
www.jblearning.com

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Preface

It is an honor for the three of us to continue the publication of this text, initially authored by Dr. Mary Jane Schneider over two decades ago (and now bearing her name in the title). With great reverence for its legacy, we have enhanced and expanded upon the previous editions, ensuring its relevance and comprehensiveness in today's dynamic landscape of public health, particularly in the aftermath of a global pandemic.

While proudly bearing the Schneider name, this edition represents a collaborative effort, blending timeless concepts with contemporary insights. Drawing from the *Sixth Edition*, we have updated data, current events, and perspectives, ensuring its resonance with the evolving needs of educators and students alike.

As professors, we understand the challenges of covering a significant amount of material and making difficult decisions about what to cover and what to leave out, so we have streamlined the content into 17 chapters, mirroring the structure of a standard academic semester. We have thoughtfully incorporated subsections within these chapters, empowering educators to tailor their instruction to suit varied learning objectives and preferences.

Aligned with the rigorous standards of the Council on Education for Public Health (CEPH), this edition delves deeper into emergent challenges, notably addressing the profound impacts of the COVID-19 pandemic, the drug crisis, and climate change on public health. Emphasizing the interconnectedness of systemic and structural factors, we have

woven a narrative that elucidates the intricate web of influences shaping population health. We have focused on stressing systemic and structural issues and how these impact the health of the population. We added frameworks, including the social determinants of health and life course perspective, to encourage the reader to think “upstream” and to be critical of past and current approaches to solving public health problems.

At the forefront of our pedagogical approach lies a commitment to fostering active engagement and critical inquiry among our readers. To this end, we have augmented the teaching materials with thought-provoking discussion questions, supplementary resources, and innovative suggestions for experiential learning, catalyzing a deeper understanding and appreciation for the discipline. As stewards of public health education, we are driven by a profound sense of purpose fueled by the belief that knowledge is not static, but a catalyst for transformative action. We are confident that the updates and realignment of content will provide future public health professionals with a basis of knowledge to confront the complex challenges of our time with resilience and resolve.

Indeed, public health is as much a science as it reflects societal values and political realities. Acknowledging this inherent tension, we endeavor to navigate the nuances of the scientific and political spheres, illuminating the intersections of policy decisions and public health imperatives.

In unveiling the complexities of public health, we invite our readers on a journey of

discovery—one that is as enlightening as it is enriching, as contentious as it is captivating. We hope that by providing a comprehensive text and embracing the complexities of our

field, we may inspire a new generation of public health advocates poised to effect meaningful change in our communities and honor Dr. Schneider's legacy.



Prologue: The New Edition

This comprehensive text navigates readers through the fundamental concepts of public health, emphasizing the intersections of scientific knowledge, compassion, and social responsibility. Delving into the multifaceted domain of public health, it elucidates the intricate forces that mold our collective health landscape. Serving as a tribute to the interconnectedness of individuals and societies across local, national, and global spheres, it underscores the imperative of collaborative action in nurturing a healthier and more equitable world.

The text begins with a deliberate focus on foundational concepts in public health.

Chapter 1: Public Health: Science, Politics, and Prevention provides principles that underpin the field, ethical considerations, and theoretical frameworks that have shaped public health into what it is today. This includes the 10 essential public health services, a discussion on upstream and downstream approaches, and how these impact population health. The three levels of prevention—primary, secondary, and tertiary—are discussed along with disease prevention concepts.

Chapter 2: The Drivers of Health takes an ecological view of human health and introduces readers to the life course perspective. This chapter highlights the impact of social determinants of health on population health and public health professionals' role in reducing the burden of diseases and deaths on populations. This chapter delves into stress and health, along with how systemic issues

like racism impact health outcomes. Finally, this chapter ends with theories to understand health behavior.

Chapter 3: Health Across the Lifespan applies the life course perspective to guide readers through pivotal factors influencing maternal and child health, emphasizing the moral obligation to improve pregnancy and birth outcomes for every parent and infant. Subsequently, it delves into health obstacles faced by adult populations, with in-depth exploration of pertinent topics in subsequent chapters. Finally, this chapter offers an insight into the health concerns prevalent among older adults, a demographic rapidly expanding within the United States. Given our increasing lifespan, it becomes imperative to address the distinctive health challenges accompanying aging.

Chapter 4: Government Influence and Responsibilities explains why some consider public health a controversial discipline. It includes information on topics such as access to health care, health-related policies to protect the population, and their impact on the socioeconomic landscape. The political influence of the COVID-19 pandemic and decisions made by the U.S. government impact population health.

Chapter 5: Public Health Research Methods is a new chapter that explores study designs for qualitative and quantitative data. The chapter explains the step-by-step research process of conducting public health research.

This includes starting with an idea and distributing it to others.

Chapter 6: The Role of Data and Statistics in Public Health describes the terms and concepts needed to collect and analyze public health data. This includes concepts of type of rates, probability, and types of data used in public health. Furthermore, national data sets utilized by public health professionals are explored.

Chapter 7: Infectious Diseases focuses on the historical challenges with infectious diseases and the role of public health in reducing their impact. This chapter discusses how diseases are transmitted and how previously “conquered” infectious diseases are emerging and threatening population health. Finally, the chapter concludes by exploring why people may lack trust in vaccines and the science surrounding vaccines.

Chapter 8: COVID-19: Experiencing and Learning from a Global Pandemic is new to the text and provides an extensive account of how the pandemic unfolded over the past few years. It offers comprehensive graphs for readers to explore trends in transmission, vaccinations, and the challenges of controlling the spread of disease. This chapter critically examines the public health response and encourages readers to think about lessons learned, as this will likely not be the last pandemic in the 21st century.

Chapter 9: The Science and Principles of Epidemiology offers a comprehensive overview of epidemiology, highlighting its pivotal role in comprehending and addressing public health concerns. This chapter aims to use both past and present public health events to explore the foundations of epidemiology beginning with an exploration of its historical significance, including seminal events such as Dr. John Snow and the London Cholera outbreak to the recent COVID-19 pandemic. Furthermore, the chapter delves into the multifaceted applications of epidemiology,

describing the role of epidemiology in both chronic disease management and the containment and prevention of infectious diseases.

Chapter 10: Genetic and Chronic Diseases discusses the impact of genetic diseases on population health by examining newborn screenings and how they represent a significant public health success. Next, the chapter covers how chronic diseases impact life expectancy and quality of life. This includes epidemiologic data on heart disease, diabetes, and cancer.

Chapter 11: Behavioral Contributors to Disease Risk focuses on the actual causes of death, including tobacco use, dietary patterns, and physical inactivity. Contemporary issues, including tobacco use, food insecurity, and the impact of the environment on health, are discussed. This chapter discusses the impact of social determinants of health on these issues.

Chapter 12: Public Health Approaches to Mental Health offers a novel examination of the broader ramifications of mental health on a societal scale. With a particular focus on college students, it adopts a life course perspective to illuminate key insights. Covering prevalent mental health conditions, it delves into their prevalence and the public health strategies aimed at addressing these pervasive issues within our communities.

Chapter 13: A Clean Environment: The Basis of Public Health explores how environmental pollution and hazards impact human health. It is divided into subsections describing air, water, and solid and hazardous wastes. The subsections identify the major pollutants in the air, water, and soil, respectively, and briefly describe government regulations to prevent and control environmental pollution.

Chapter 14: Climate Change: The Most Important Public Health Challenge of the 21st Century? reviews evidence on the increase in greenhouse gases and its resulting environmental and health impacts. This chapter introduces the concept of planetary

health and summarizes mitigation and adaptation strategies adopted in the United States to address natural disasters and climate change impacts.

Chapter 15: Regulations That Impact Health covers food-borne illnesses and the Food and Drug Administration (FDA) regulatory mandates to prevent and control food-borne diseases. The chapter also describes political influences on the FDA.

Chapter 16: The U.S. Medical System as a Public Health Problem explores how public health and medicine must work together to impact population health. This chapter explores conflict, licensing, and ethical considerations. The chapter calls for reform of the

healthcare system to reduce costs and increase access.

Chapter 17: Future of Public Health explores the future landscape of public health and the profound shifts in the wake of the COVID-19 pandemic and subsequent epidemic responses. Beyond these immediate crises, the chapter delves into the ongoing evolution of public health practices. It highlights emerging challenges such as the integration of artificial intelligence and the imperative for a cohesive strategy that melds medical care with public health initiatives. We highlight the imperative for continual adaptation and innovation within the field to foster resilience and address the complex health needs of society.



Acknowledgments

May this book inspire others to pursue a career in public health. My path to this field was not linear, but I would not be here without all of my amazing mentors at the University of Michigan-Flint, University of Toledo, the University at Buffalo, and beyond. Special thanks to my parents for always believing in me and supporting me.

—*Jessica Kruger*

Thank you to the students whose curiosity and engagement have been my greatest teachers in public health, revealing insights far beyond the confines of the classroom. Special thank you to Deanna, Alessandra, Mia, Kennan, Luisa, James, and Sophia for giving me the confidence to take on this project.

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Thank you to Jessica Kruger and C. Eduardo Siqueira for their expertise, and hard work. I am so grateful to have worked with both of you.

—*Andy Morales*



About the Authors

Jessica S. Kruger, PhD, MCHES, is a health educator whose research focuses on consumption and addictive behaviors, health behavior decision making, and pedagogy in public health. She collaborates with a wide variety of community-based organizations and advises students at the Lighthouse Free Medical Clinic and the Seneca-Babcock Community Center, both in the Western New York area. Dr. Kruger is the vice-chair of the board of directors for the Society of Student-Run Clinics and focuses on increasing the interprofessional collaboration in free clinics around the United States. She also serves as a member of the leadership team of Interprofessional Education and Collaborative Practice at the University of Buffalo. Most recently, Dr. Kruger has been named a 2021 SUNY Online Ambassador for her enthusiastic, effective virtual teaching and advocacy of online education in the SUNY community. She recently joined the editorial board for the journal *Pedagogy and Health Promotion*. Dr. Kruger is the recipient of the 2024 ASPPH Early Career Teaching Excellence Award, which recognizes a junior faculty member for outstanding teaching and mentoring of students toward distinction in public health research, teaching, and practice.

Andy Morales, PhD, MPH, CHES, earned his doctorate from the University of Colorado Denver in health and behavioral science and his MPH from New Mexico State University,

specializing in community health education. He also served as a faculty member at the Southern New Mexico Family Residency Program in New Mexico, and as a research project lead with the Fred Hutchinson Cancer Research Center in Seattle. Dr. Morales's research collaborations focus on the intersection of public health and clinical medicine, working in interprofessional groups (e.g., medical anthropologists, social workers, and clinical psychologists) to improve patient care and community health. This included his doctoral research, which examined the impact of chronic illness severity on depression outcomes in primary care settings among low-income, complex patients. His most recent clinical-based research focused on training family medicine residents in communication strategies to discuss chronic pain and treatment management and integrate social determinants of health into the residency curriculum. He has also served as a program evaluator for various public health and clinical interventions.

His recent work has focused on developing and implementing supplemental public health education outside the classroom to promote students' collaboration with community partners. Dr. Morales has published in public health and medical education journals, including *Frontiers in Public Health*, *Journal of Cancer Prevention*, *Journal of Education and Health Promotion*, and *Journal of the American Board of Family Medicine*.

Dr. Carlos Eduardo Siqueira, ScD, MD, MPH, is a professor of environment and public health at the School for the Environment and coordinator of the Transnational Brazilian Project at the Mauricio Gastón Institute of Latino Community Development and Public

Policy at the University of Massachusetts Boston. Over his career, he has researched the political economy of the migration of hazards between developed and developing countries, Brazilian immigrant health, health policy, and health and safety inequities at work.



CHAPTER 1

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Public Health: Science, Politics, and Prevention

KEY TERMS

Assessment

Assurance

Biomedical sciences

Environmental health science

Epidemiology

Infectious diseases

Life expectancy

Mainstream medicine

Policy development

Primary prevention

Secondary prevention

Social and behavioral sciences

Statistics

Tertiary prevention

One expectation of living in a high-income, developed country like the United States is that the law and infrastructure are fundamentally designed to support long, healthy lives, and there are prevailing assumptions of safety. Many people believe that the water they consume will not make them sick, the food they ingest is uncontaminated, the aspirin they take for a headache is accurately labeled, and a mosquito bite merely results in a bothersome itch. Historically, the expectation of a long, healthy life is relatively recent, primarily from advances in treating and preventing infectious diseases. In the mid-19th century, when record-keeping began in England and Wales, death rates were very high, especially among children. Of every 10 newborn infants, 2 or 3 never reached their first birthday, 5 or 6 died before they were 6 years old, and only about 3 of the 10 lived beyond 25.¹ Tuberculosis was the single largest cause of death in

the mid-19th century. Cholera, typhoid, and smallpox epidemics swept through communities, killing people of all ages and making them afraid to leave their homes. Injuries—often fatal—to workers in mines and factories were common and expected due to unsafe equipment, long working hours, poor lighting and ventilation, and child labor. Similar to the present-day health outcome disparities—particular types of health differences that are closely linked to economic, social, and environmental disadvantages²—these illnesses and fatalities disproportionately impacted socioeconomically disadvantaged individuals. Factors such as population density, inadequate sanitation, polluted water, crowded living conditions, unemployment, and unfavorable work environments contributed to sickness and premature death.

There are many reasons why people's lives are generally healthier today than they were

150 years ago: cleaner water, air, and food; safe disposal of sewage; medical technology (e.g., vaccines, antibiotics, antivirals, and advances in surgery), better understanding about the relationship between daily habits and behaviors (e.g., dietary practices, physical activity, tobacco use) and health outcomes (e.g., diseases of the heart, certain cancers, metabolic dysfunction). Even after the global declaration of COVID-19 as a pandemic, which significantly disrupted this perceived sense of safety, a substantial portion of the U.S. population still maintains a sense of trust that they will live a long and healthy life. However, these expectations are not a reality for everyone.

Although people living longer may have more access to medical technology, preventive measures, and instantaneous health-related information, there are disadvantaged individuals and under-resourced communities with little to no access to fundamental health care and less political power, leading to recent public health crises, such as the lead contaminated water in Flint, Michigan, and Jackson, Mississippi; instances of *Escherichia coli* contamination in spinach cultivated in Texas and Colorado; and “cancer alley” in Louisiana.^{2,3,4}

Despite many community sectors advocating for better living conditions and developing and implementing public health programs to promote good health and mitigate illness and disease, people often look to the local, state, or national governments to take primary responsibility for health promotion and disease prevention. As it stands, governments are responsible for providing potable water, efficiently disposing of sewage, and ensuring food supply safety. When necessary, governments also monitor and intervene to improve the quality of medical services provided through hospitals and medical clinics, assisted living facilities, and other institutions responsible for caring for people. Laws regulating people's behavior prevent them from injuring each other, and the immunization of school-aged children prevent the spread of **infectious diseases**. Governments also sponsor research

and education programs on the causes and prevention of disease and determine where health infrastructure is built and maintained; in this way, when health crises happen in the United States, they are typically the result of systemic problems like racism, classism, and discrimination.⁵ The COVID-19 pandemic demonstrated the importance of public health and did a great deal to bring increased recognition to the field. Still, it also elucidated the unique challenges experienced by historically marginalized populations who often deal with the greatest burden of disease and socioeconomic impacts.

1.1 What Is Public Health?

The landscape of how we learn about and discuss public health has transformed permanently due to the COVID-19 pandemic. Navigating this crisis demanded an accelerated immersion into public health principles, including concepts from epidemiology and biostatistics and frameworks discussed throughout this text. In a seemingly swift change, pandemic-related terminology, such as flattening the curve, incubation period, infection rate, and preventive measures like quarantine and social distancing, permeated news outlets and everyday conversations. Nevertheless, the concept of public health remains elusive in terms of definition and understanding as a field of study and practice. A crucial need persists to assist policymakers and the broader public in comprehending the core mission of public health—clarifying its significance and functions while delineating what it encompasses.

The public health domain is about the many advancements contributing to longer life expectancies and improving conditions for health. Still, it also includes understanding the causes of and developing solutions for health inequities and inequalities. Public health practitioners, actively engaged in

research, strive to prevent disease, disability, and premature death and work to create and enforce policies designed to support their efforts. Charles-Edward A. Winslow, a theoretician and public health leader during the first half of the 20th century, defined public health in 1920 this way:

The science and the art of preventing disease, prolonging life, and promoting physical health and efficiency through organized community efforts for the sanitation of the environment, the control of community infections, the education of the individual in principles of personal hygiene, the organization of medical and nursing services for the early diagnosis and preventive treatment of disease, and the development of the social machinery which will ensure to every individual in the community a standard of living adequate for the maintenance of health.^{3(p.1)}

Though Winslow's definition is still valid, the definition of public health has evolved to keep up with the changing situations by including policy and advocacy efforts to ensure that individuals have access to quality health care and are safe from violence, addressing the impact of climate change on health outcomes, increasing the protection of workers, and developing specific policies to protect vulnerable populations like children and older adults.

For several decades after Winslow offered his definition of public health, public health had many successes, carrying out many tasks described in his definition. It was highly effective in reducing the threat of infectious diseases, thereby increasing the average lifespan of Americans by several decades. Toward the end of the 20th century, public health was taken for granted, and most people were unaware of its activities. Yet some signs indicated that the system was not functioning

well. Government expenditures on health care were alarmingly high, but most were directed toward treating diseases, not preventing them. There was little attention to public health. At the same time, new health problems appeared: The acquired immunodeficiency syndrome (AIDS) epidemic broke out; concern about environmental pollution grew; the aging population meant a need for more health care and resources; and social problems such as an increase in diagnosed mental illness, violence (i.e., homicide and suicide), and substance abuse became more common. In recent years, there has been a shift in recognizing numerous health-related issues like these as matters of public health rather than solely individual concerns.

Over 30 years ago, the Institute of Medicine (IOM, now the National Academy of Science, Engineering, and Medicine [NASEM]) published *The Future of Public Health*, which focused on public health's importance and greatly revitalized the field. One of the first tasks the study committee set for itself was to reexamine the definition of public health, reasoning that for it to be effective, public health had to be broadly defined.⁶ The committee's report defines public health's mission, substance, organizational framework, and core functions.

The Future of Public Health defines the mission of public health as "the fulfillment of society's interest in assuring the conditions in which people can be healthy."^{7(p.40)} The substance of public health is "organized community efforts aimed at the prevention of disease and the promotion of health."^{7(p.41)} The organizational framework of public health encompasses "both activities undertaken within the formal structure of government and the associated efforts of private and voluntary organizations and individuals."^{7(p.42)} Public health has three core functions:

1. Assessment
2. Policy development
3. Assurance^{4(p.43)}

Table 1-1 The Ten Essential Public Health Services

Assessment
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
Policy Development
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
Assurance
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
Serving All Functions
= Equity
Centers for Disease Control and Prevention. 10 Essential Public Health Services. https://www.cdc.gov/publichealthgateway/publichealthservices/essentialhealthservices.html

Another committee later translated these core functions into a more concrete set of activities called the Ten Essential Public Health Services (**Table 1-1**).

Comparing Mainstream Medicine to Public Health

A helpful approach to gaining a deeper insight into the dynamics and roles of public health is to draw comparisons with **mainstream medicine**, often referred to as “Western” or traditional medicine, the prevalent medical model in most developed countries. While mainstream medicine is primarily centered on

addressing the needs of individual patients, public health takes a broader perspective by considering the entire population as its “patient.” Mainstream medicine is dedicated to treating individual illnesses, whereas public health emphasizes the proactive mitigation of illnesses through health promotion and disease prevention strategies for populations.

Public health operates similarly to a medical provider engaging with a patient in fulfilling its fundamental responsibilities. It systematically evaluates the overall health of a population, diagnoses prevalent issues, investigates their root causes, and formulates comprehensive strategies to modify or change them,

The River Story

A well-known metaphor to help understand the differences between clinic-based medical care and fundamental public health practice is the upstream-downstream parable (also called the river story). Using McKinlay's original version.⁸

Imagine walking along a river's shore following the current. You hear someone cry for help, and you jump into the river and pull the person to shore. As you are helping the person to breathe, you hear another cry for help, so you jump back in and pull that person to shore and help them, and then another cry for help and another and another. . . You realize there must be a cause upstream for these people to end up being swept downstream by the current, but you cannot both stop to investigate and save the people who have already fallen in. You try to teach those caught up in the current to tread water, and though this helps some, it is very difficult to learn to swim or tread water while drowning.

This metaphor represents the tireless work of the medical care system. The people being swept downstream represent people living with illnesses, while you represent a clinical care provider. Though you are doing everything you can to “treat” as many people as you can, it is evident that (1) you cannot do this alone; (2) not everyone has been previously taught to swim or tread water, and this may not be time for that; (3) both you and the people who have fallen in the river are susceptible to frustration, exhaustion, and burnout; and (4) someone needs to go upstream to determine what is causing people to end up in the river in the first place (public health preventive efforts). As Bishop Desmond Tutu put it, “There comes a point when we need to stop *just* (emphasis added) pulling people out of the river; we need to go upstream and find out why they are falling in.” We can use this parable to show the importance of collaboration between medical care and public health. Accepting that there will always be a need for “downstream” treatment, public health efforts are intended to stop people from falling in the river in the first place or reduce the severity of people's illnesses if they do fall in (learning to swim and tread water). There are several versions of the parable, and it has been modified to our understanding of what is contributing to illness and premature death. It has been expanded to consider the different “manufacturers of illness.” “Upstream” causes include genetic predispositions and the social and structural causes of illness, while “midstream” represents individual behaviors and other proximal causes.

thereby minimizing adverse health outcomes. The **assessment** aspect entails the diagnostic role, wherein a public health agency gathers, organizes, analyzes, and disseminates information concerning the population's health. Comparable to a medical provider crafting a treatment plan for an ailing patient, **policy development** in public health employs scientific knowledge to devise a strategic approach to enhance the community's well-being. **Assurance** mirrors the medical provider's actual treatment of the patient, where public health ensures that essential services vital for safeguarding the community's health are both available and accessible to all. These include health education and crucial preventive screening services. If public health agencies cannot

provide these services, they must encourage other entities to do so or enforce such actions through regulatory measures.

Public health's focus on prevention makes it more abstract than medicine, and its achievements are more difficult to recognize. The medical provider who successfully treats a person's illness has achieved a recognizable benefit, and the patient is grateful. This is not the same for public health. Public health cannot point to the people spared illness by its efforts. As Winslow wrote in 1923:

If we had but the gift of second sight to transmute abstract figures into flesh and blood, so that as we walk along the street, we could say, ‘That

man would be dead of typhoid fever,’ ‘That woman would have succumbed to tuberculosis,’ ‘That rosy infant would be in its coffin,’—then only should we have a faint conception of the meaning of the silent victories of public health.^{8(p.65)}

This “silence” largely accounts for the relative lack of attention paid to public health by policymakers and the public compared to mainstream medicine. Less than 3% of the United States’ total health spending is estimated to be devoted to public health.⁹ During the presidential campaigns leading up to the 2016 and 2020 elections, virtually all of the discussion related to health focused on how to pay for medical care, ranging from a Medicare-for-all single-payer system at one extreme to a privatized Medicare at the other extreme, yet very little attention was paid to funding for public health. In contrast, the health reform law passed in 2010 during the Obama administration included significant provisions and funding for prevention, wellness, and public health.⁷

Effective public health programs save money on medical costs and lives. Moreover, public health contributes a great deal more to the health of a population than medicine. While the **life expectancy** for people living in the United States increased from 47 to 77 years over the course of the 20th century, only 5 of those 30 additional years can be attributed to the work of the medical care system.^{7,9} Most of the gain has come from improvements in public health, broadly defined as better nutrition, housing, sanitation, and occupational health and safety. The striking benefits of public health continue apace. According to analyses, introducing the pneumococcal conjugate vaccine into the routine infant immunization program in the United States in 2000 prevented 13,000 deaths between 2000 and 2008, while an improvement in this vaccine in 2010 averted an additional 1000 deaths per year.^{10,11} One

responsibility of public health, as noted in the IOM report, is to educate the public and politicians about “the crucial role that a strong public health capacity must play in maintaining and improving the health of the public... By its very nature, public health requires support by members of the public—its beneficiaries.”^{4(p.32)}

Public health, like medical practice, is based on science. However, even when public health scientists know about the causes of a problem and what should be done to address it, political decisions and actions are generally necessary to do anything about it. When a medical provider diagnoses a patient’s illness and recommends a treatment, the patient has the prerogative to accept or reject the medical provider’s recommendation. When the “patient” is a community or a whole country, usually a government—federal, state, or local—must decide to accept or reject the recommendations of public health experts. Sometimes, the process starts within the community when, like a patient going to a medical provider with a complaint, people recognize a problem and demand that the government act. This has occurred in many communities when victims of vehicle crashes resulting from drivers under the influence of alcohol form organizations such as Mothers Against Drunk Driving to lobby for stricter laws or when neighbors of pollution-generating factories demand that the government force the industry to clean up their environments.

As was evident with COVID-19, politics is intertwined with the public health process, particularly in policy development and notably within the assurance function. Given that the community is tasked with covering the costs of “treatments,” typically through taxation, decisions must be made regarding how much they are willing to allocate resources to “health.” Additionally, the community must consider potential restrictions on individual freedoms necessary to enhance overall public health. One of the assurance functions of public health involves providing basic

medical services, a subject that has sparked significant political debate. As highlighted in the IOM report, public health professionals sometimes display impatience toward politics, viewing it more as a contaminant in an ideally rational decision-making process rather than as an indispensable element of democratic governance.”^{4(p.5)}

1.2 The Sciences of Public Health

The scientific knowledge on which public health is based spans a broad range of professional disciplines. The IOM report notes that “public health is a coalition of professions united by their shared mission” as well as by “their focus on disease prevention and health promotion; their prospective approach in contrast to the reactive focus of therapeutic medicine, and their common science, epidemiology.”^{4(p.40)} The disciplines of public health can be divided somewhat arbitrarily into six areas. Epidemiology and statistics are the basis for the assessment functions of public health, including collecting and analyzing information. Both assessment and policy development need an understanding of the causes of health problems in the community. This understanding depends on biomedical, social, behavioral, and environmental sciences. As part of the assurance function, public health seeks to understand the medical care system in an area of study generally referred to as health policy and management or health administration, which also includes the administration and functioning of the public health system

Epidemiology has been called the basic science of public health. As its name suggests, epidemiology is the study of epidemics. It focuses on human populations, usually starting with an outbreak of disease in a community. Epidemiologists look for common exposures or other shared characteristics in sick people, seeking the causative factor. Epidemiology often provides the first indications

of the nature of a new disease. When human immunodeficiency virus (HIV)/AIDS was first recognized in the early 1980s, its cause was unknown. Medical providers reported cases of this unusual disease to the Centers for Disease Control and Prevention, and epidemiologists began looking for common characteristics among the patients. Epidemiologic research indicated that it was an infectious disease spread through blood and body fluids and suggested a virus as the cause. This prompted biomedical scientists to step in and look for the virus. The same processes were used to identify and monitor COVID-19. Epidemiologic data were used to develop the protocols to slow the spread of the virus, such as quarantine and mask guidelines, and to identify high-risk groups like healthcare workers and older adults.

Epidemiology is essential for deciphering the causes of exotic new diseases and preventing the spread of old, well-understood diseases. Epidemiologists are the mainstays of local health departments. In what is commonly known as “shoe-leather epidemiology,” they may track down, for example, the source of a food poisoning outbreak and force a restaurant to clean up its kitchen. Likewise, they may trace everyone in contact with a college student diagnosed with meningitis to administer high doses of antibiotics, thereby preventing the spreading of this dangerous disease. Epidemiologic studies have also been important in identifying the causes of chronic diseases such as heart disease and cancer.

Because public health deals with the health of populations, it depends very heavily on **statistics**. Governments collect data on births and deaths, causes of death, outbreaks of communicable diseases, cancer cases, occupational injuries, and other health-related issues. These numbers are diagnostic tools, informing experts how healthy or sick a society is and where its weaknesses are. For example, of all high-income countries in 2020, the United States possessed the highest infant mortality rate at 5.4 deaths per 1000

live births, which is markedly higher than the 1.6 deaths per 1000 live births in Norway, which has the lowest mortality rate. Additionally, the United States' maternal mortality in 2020 was over three times the rate in most of the other high-income countries, with 23.8 maternal deaths for every 100,000 live births.¹² The science of epidemiology is examined in more detail in subsequent chapters.

To understand what the numbers mean, it is necessary to understand certain statistical concepts and calculations. The science of statistics is used to calculate risks from exposure to environmental chemicals, for example. Statistical analysis is an integral part of any epidemiologic study seeking the cause of a disease or a clinical study testing the effectiveness of a new drug.

Both public health and mainstream medicine depend on the **biomedical sciences**. Microorganisms cause a significant proportion of human disease. Prevention and control of infectious diseases in a population require understanding how infectious agents are spread and how they affect the human body. Control of infectious diseases was a major focus of public health in the 19th and early 20th centuries. Biomedical research successfully determined the major killers of that period, providing the information and techniques by which successful public health measures could bring these diseases under control.

Biomedical research remains vital to the understanding and control of newer diseases such as HIV/AIDS, which became the major epidemic of the late 20th and early 21st centuries worldwide. It has also contributed to our knowledge of noninfectious diseases such as cancer and heart disease, which have become increasingly important as many infectious diseases have been effectively controlled. Recent progress in understanding human genetics provides new insights into people's inherent susceptibility to various diseases, raising both new hopes for treatments and concerns about discrimination.

Environmental health science, a classic component of public health, is concerned with preventing the spread of disease through

water, air, and food. Although it is not strictly a separate science because it shares concerns about the spread of infectious organisms with biomedical sciences and depends on epidemiology to track environmental causes of disease outbreaks, it is usually considered a separate area of public health. Much of the improvement in the health of the general population in the United States in the last 120 years is due to improved environmental health, especially because most people in the United States have safe drinking water and sanitation. Environmental health depends on engineering to design, build, and maintain these systems to address safe water and waste disposal concerns.

Although the importance of safe air, water, and food has been recognized for many decades, many new challenges to environmental health continue to emerge. Old systems fail, and new problems arise from modern lifestyles. Thousands of new chemicals enter the environment yearly, and little is known about their effects on human health. Toxic chemicals have accumulated in the ground, and methods must be devised to dispose of them safely. Other environmental threats to health include ultraviolet rays in sunlight and exposure to different kinds of radiation. In addition, human activities are causing changes in Earth's climate, permanently altering the environment and significantly affecting human health.

Increasingly, public health is also concerned with **social and behavioral sciences**. As biomedical and environmental sciences have conquered many of the diseases that killed people of previous generations, people in modern societies are dying of infections caused by their behavior and the social environment. Heart disease is related to nutrition and exercise patterns; many forms of cancer are caused by smoking; abuse of drugs and alcohol is a notorious killer. Violence is a significant cause of death in our society, with increases in mass shootings, completed suicides, and domestic murders.

Some subgroups of the population have poorer health overall than others for reasons that, while not completely understood, relate

to social and behavioral factors. People with low incomes are less healthy than those with a higher socioeconomic status. Black Americans have lower life expectancy than non-Hispanic White Americans, even when their incomes are similar. Other ethnic minoritized groups, especially non-White Hispanic people and Indigenous/American Indians, are at increased risk for health problems.*

Social and behavioral sciences involve more unanswered questions than biomedical and environmental sciences. Not enough is known about why racial and ethnic groups differ in health-related behaviors, why many people of all races behave in unhealthy ways, and how to prevent self-destructive behaviors. In the social and behavioral sciences, among all the areas encompassed by public health, research and application of the findings are most likely to make a difference in the future. In particular, the focus has now shifted from the individual to the structural components that impact human health.

Until the beginning of the 20th century, public health and mainstream medicine overlapped substantially in their spheres of interest and activity. Both fields were concerned primarily with understanding the causes and prevention of infectious diseases because medicine was relatively powerless to cure them. With the discovery of antibiotics, however, medicine gained power, leading to a period in which its influence grew rapidly. Meanwhile, public health faded into obscurity because of its less glamorous task of preventing disease. In 2020, public health was no longer obscure as recommendations to deal with the COVID-19 pandemic impacted many of us, from stay-at-home orders to mask mandates and mandatory vaccinations.

Over the past few decades, it has become apparent that our society's emphasis on curing

disease rather than preventing it has gone far out of balance. Medical care has become so expensive that a large proportion of the population cannot afford it, and spending on medical care has eaten up resources that could more profitably be used for education, housing, and cleaning the environment. Concerns about runaway costs, lack of access, and questionable quality of health care have led to an increasing interest in studying the medical care system—its effectiveness, efficiency, and equity—leading to a discipline called health services research. Traditional categorization of public health fields classifies this study area into health policy and management or health administration.

1.3 Prevention and Intervention

Public health's approach to health problems in a community has been described as a five-step process:

1. Define the health problem.
2. Identify the risk factors associated with the problem.
3. Develop and test community-level interventions to control or prevent the cause of the problem.
4. Implement interventions to improve the health of the population.
5. Monitor those interventions to assess their effectiveness.⁶

Thus, the main task of prevention is to develop interventions designed to prevent specific problems identified either through an assessment process initiated by a public health agency or through community concerns raised by an unusual course of events. For example, statistical data may show that a community

*The authors underscore that race is a social construct and adverse health outcomes and disparities are not inherently linked to race, but rather to the determinants of health that disproportionately impact communities of color. These factors, including socioeconomic status, access to healthcare, and environmental conditions, pose significant barriers to achieving equitable health outcomes.

has a high rate of cancer compared to similar communities, or a series of fatal crashes caused by drunk driving may mobilize a community to demand action to prevent further tragedies.

Public health has developed systematic ways of thinking about such problems that facilitate designing interventions that prevent undesirable health outcomes. One approach is to think of prevention on three levels: primary prevention, secondary prevention, and tertiary prevention. **Primary prevention** prevents an illness or injury by preventing exposure to risk factors. **Secondary prevention** aims to minimize the severity of the illness or the damage resulting from an injury-causing event once the event has occurred. **Tertiary prevention** aims to reduce disability by providing medical care and rehabilitation services.

For example, primary cancer prevention interventions include discouraging teenagers from using tobacco and encouraging current tobacco users to quit before a diagnosis. In secondary prevention, screening programs are established to detect cancer early when it is still treatable. Tertiary prevention involves the medical treatment and rehabilitation of cancer patients.

This way of thinking was very effective in developing traffic safety programs that, over the

past five decades, have significantly reduced the rates of injury from motor vehicle crashes. Primary prevention is the prevention of crashes by building divided highways and installing driver-assistance software in cars to correct lane departures and avoid collisions. Secondary prevention includes the design of safer automobiles with seat belts, airbags, and safety sensors. It also includes developing policies and enforcing laws requiring drivers and passengers to wear seat belts. Tertiary prevention focuses on requiring emergency medical services, including ambulances, 911 calling networks, and trauma centers, especially in high-traffic areas.

Another approach to designing interventions is considering an illness or injury as a chain of causation involving an agent, a host, and the environment, the epidemiological triad (**Figure 1-1**). This approach is traditionally applied to infectious diseases: The agent may be a disease-causing bacterium or virus; the host is a susceptible human being; and the environment includes the means of transmission by which the agent reaches the host, which may be contaminated air, water, or food, or another human being who is infected. Prevention is accomplished by interrupting the chain of causation at any step. Rendering a potential host unsusceptible through

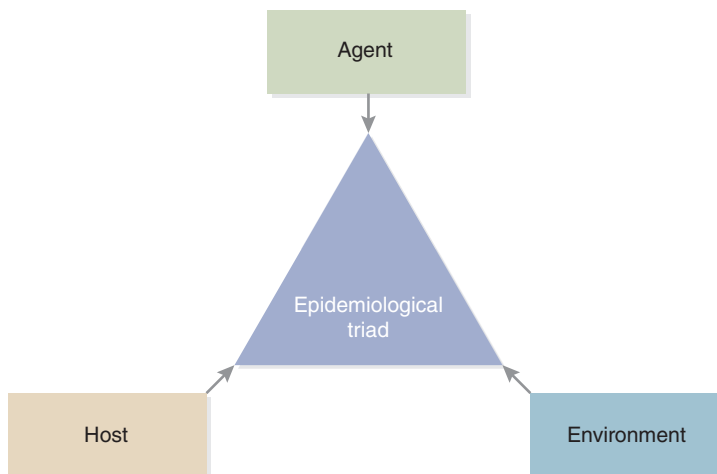


Figure 1-1 The Epidemiological Triad

immunization, for example, can interrupt the chain. Alternatively, the bacterium infecting a host can be killed through antibiotics, or the environment can be sanitized through water and food purification.

The chain of causation model can also be used for other illnesses or injuries. For example, suicide is the third-leading cause of death in the 15- to 24-year-old age group.^{13 (Table 20)} In applying the model to the prevention of youth suicide, the host is the susceptible young person; the agent is most often a gun or an overdose of pills; and the environment includes the young person's whole social environment, including family, school, and social media. A public health intervention could make young people less susceptible to self-destructive thinking by sharing the research on the negative impacts of social media on mental health that may lead to feelings of inadequacy, loneliness, and trying to live up to unattainable standards. However, the public health perspective tends to assume that the most effective intervention priority for youth suicide prevention is the agent, especially guns. Many adolescents are susceptible to depressed moods and think of killing themselves, but the best predictor of whether they will commit suicide is whether they have access to a gun.¹³

1.4 Conclusion

This chapter has shown that public health is a broad field often misunderstood. It includes a goal—maximum health for all—and the means of achieving it. Public health is concerned with the prevention of disease and disability. Unlike mainstream medicine, which focuses on the individual, it aims to benefit the entire population and, considering the upstream-downstream metaphor, needs the collaborative efforts of both to meet the aspirations of everyone having access to health care and living a long life free of disease and disability.

The public health functions in a community can be compared with the functions of a

medical provider in caring for a patient. Public health diagnoses and treats the community's ills through assessment, policy development, and assurance. It relies on the tools of science and politics. The public health sciences of epidemiology and statistics are applied in assessing a population's health. Policy is developed based on biomedical sciences, social and behavioral sciences, environmental health sciences, and the study of the medical care system. Public health depends on politics for decision making. Decisions on public health interventions to be taken by the community, insofar as they require government action, are reached through politics.

Public health focuses on the prevention of disease and disability. Preventive measures can be applied at three levels: Primary prevention aims to prevent a disease or injury from occurring at all; secondary prevention aims to minimize the damage caused by the illness or injury-causing event when it occurs; and tertiary prevention seeks to minimize any ensuing disability by providing medical care and rehabilitation.

Public health prevention programs function through interventions designed to interrupt the chain of causation that leads to an illness or injury. Interventions can be directed toward eliminating or suppressing the agent that causes an illness or injury, strengthening the resistance of the host to the agent, or changing the environment so that the host is less likely to encounter the agent.

Despite the global impact of the COVID-19 pandemic, the concept of public health persists as an abstract notion frequently misconstrued and overlooked by politicians and the general populace, becoming a target for misinformation. The multitude of health challenges, coupled with the exigencies of the pandemic, compelled governmental bodies and media outlets to recognize the significance of public health in alleviating the consequences of the disease. However, this newfound attention also exposed entrenched health disparities that persist and exert ongoing

effects on the population's overall health. In 2018, the *Journal of the American Public Health Association* presented a cover story posing, "Is our readiness for the impending influenza pandemic assured?" The articles within the issue now resonate eerily with their prescient warnings, addressing concerns such

as challenges in vaccine distribution; strain on the healthcare system; heightened risks for low-income and under-resourced communities; and societal issues like xenophobia and skepticism toward research, data, and government entities tasked with safeguarding the public.

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CHAPTER 2

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The Drivers of Health

KEY TERMS

Allostatic load

Community

Ecological model

Health belief model

Intrapersonal factors

Interpersonal relations

Institutional level

Lifecourse perspective

Lifestyle choices

Prohibition

Public policy

Regulatory approach

Self-efficacy

Social determinants of health

Social norms approach

Social support

Socioeconomic status (SES)

Stress

Structural determinants

Transtheoretical model

Public health has been forced to rethink the factors influencing an individual's health status, understanding why particular individuals are more susceptible to sickness and injury, differences across populations, and the “upstream” drivers of health and illness. Although individual behavior undeniably contributes to one's health, it is important to conceptualize health as an outcome shaped by many factors. Moreover, behavior should be viewed not only as a causal factor—the traditional thinking model—but also as an outcome of social, cultural, political, historical, and environmental influences (**Figure 2-1**).

As social beings, we influence and are influenced by our social and structural surroundings, and how we interact with these environments plays a crucial role in how diseases spread in a population. These interactions create patterns where certain groups consistently experience specific health outcomes, even when individual members within the group

undergo changes or modifications to their behavior. A reason to prioritize examining the social and structural environment in the study of health behavior is that a singular focus on the individual often leads to attributing blame for their illness. Rather than viewing adverse health solely because of unhealthy behaviors and an individual's moral failure, health is influenced by the lived experience and the social and environmental surroundings in which an individual exists. Health-compromising behaviors may persist and be reinforced by elements of the social and structural environment beyond an individual's control.

Therefore, a more effective public health approach would be to focus efforts on changing the social and structural environment that molds individuals' unhealthy behaviors rather than trying to modify each person's behavior individually (Figure 2-1). Public health intervention programs should appropriately target these influential social and structural aspects

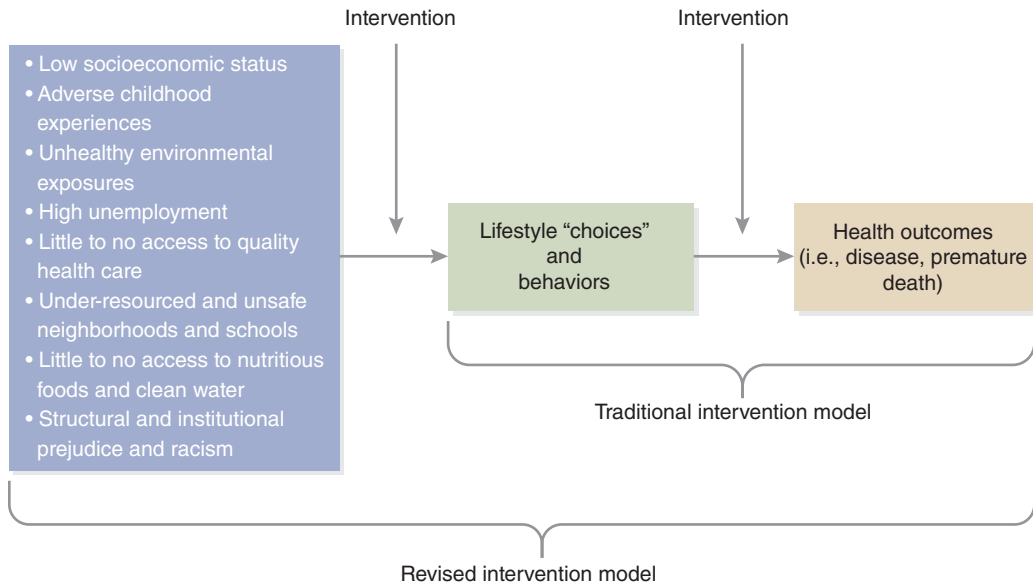


Figure 2-1 Revised Intervention Model That Considers the Social Determinants of Health

that substantially affect health outcomes. This chapter explores the key drivers of health outcomes, particularly on “upstream” factors, to better understand our behaviors, our choices, and the persistent prevalence of health disparities, especially among underserved populations. Additionally, this chapter will describe foundational public health theories to better understand psychological and sociological factors that influence health-related behavior and provide an overview of public health programs and interventions that use theories to address public health issues.

2.1 Ecological Model of Health Behavior

Ecological models propose understanding health behavior by recognizing that individual beliefs and behaviors occur in a social context. These models suggest that changing the social environment may be more effective in achieving health promotion.¹

The **ecological model** examines how the social environment, including interpersonal,

organizational, community, and public policy factors, supports and maintains unhealthy behaviors. The model proposes that changes in these factors will produce changes in individual behavior and health outcomes.

The ecological model, illustrated in **Figure 2-2**, describes five levels of influence that determine health-related behaviors; each level is a potential target for health promotion intervention. The first level—**intrapersonal factors**—encompasses the individual level determinants of health. The second through fifth levels—interpersonal relations, institutional factors, community factors, and public policy—all impact individual behavior directly and indirectly by interacting with the factors at other levels of influence.

The first level of influence, the *intrapersonal level*—including beliefs, attitudes, self-efficacy, and knowledge—defines the intricate interplay between individual-level factors and health outcomes. The intrapersonal level is at the core of the ecological framework, and it underscores the significance of individual characteristics in shaping health-related decisions and actions, as well as the importance of personal

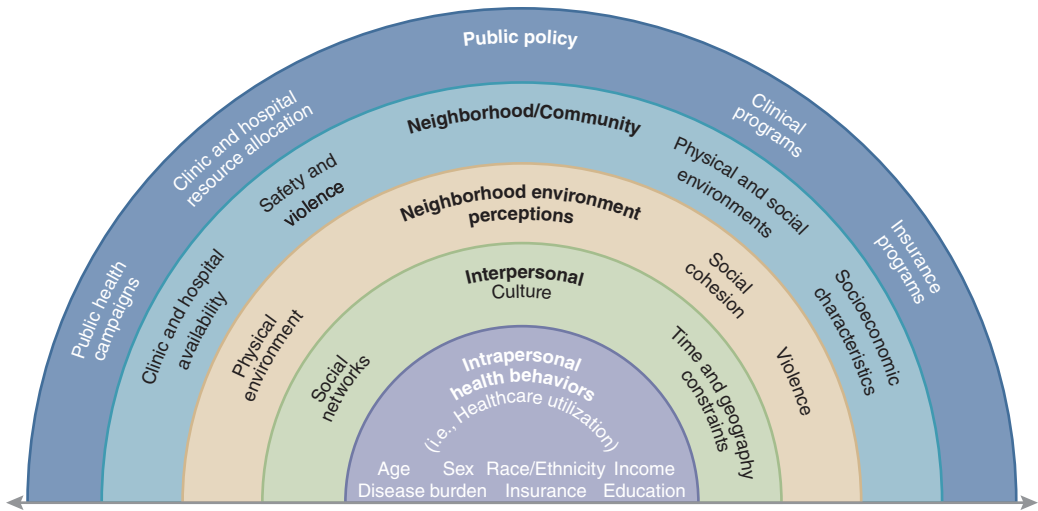


Figure 2-2 The Ecological Model

Caesar JN, Ayers C, Andrews MR, Claudel SE, Tamura K, et al. (2020) Unfavorable perceived neighborhood environment associates with less routine healthcare utilization: Data from the Dallas Heart Study. *PLOS ONE* 15(3): e0230041. <https://doi.org/10.1371/journal.pone.0230041>

agency and self-efficacy in health-related decision-making processes. Furthermore, it elucidates the dynamic interaction between intrapersonal factors and external influences, highlighting the complexities of health promotion and disease prevention efforts. Public health efforts prioritizing the intrapersonal level often involve health education, counseling, and behavior change strategies tailored to enhance self-awareness, motivation, and adaptive coping mechanisms, though more comprehensive interventions tend to have more significant impacts on health outcomes.

The second level of influence, **interpersonal relations**—including family, friends, and coworkers—significantly affects health-related behavior. Families are the origin of many health behaviors, especially habits learned early in life, such as personal hygiene, physical activity, and dietary patterns. In the teen years, pressure from peers becomes more significant in influencing individual behaviors, such as smoking tobacco, using alcohol and drugs, and engaging in other risk-taking behaviors. On the positive side, family and peer relationships provide the social support discussed later in this chapter. Application of

the ecological model at the interpersonal level would lead to different strategies in an adolescent drug prevention program, depending on the nature of the adolescents' social relationships. An adolescent belonging to a dense, homogeneous network will be more influenced by the norms and values of that group than a teen who relates individually to several individuals. In the close-knit group, drug prevention programs would have to focus on changing the norms about drug use within the existing network. When social networks are more loosely organized, the program might focus on creating drug-free networks, encouraging adolescents to associate with those networks, and reducing the desirability of membership in drug-using networks.

The third level of influence, the **institutional level**—including workplaces, learning institutions, healthcare facilities, and governmental agencies—can profoundly affect health and health-related behavior, especially workplaces and schools, where individuals devote as much as one-half of their waking hours. For example, workplaces may expose employees to hazardous chemicals or risks of injuries and accidents while also potentially fostering stress.

Conversely, institutions have the potential to cultivate a supportive corporate culture that promotes positive behavior change. This can be initiatives such as offering health-conscious menus in workplace or school cafeterias, providing and encouraging the use of exercise facilities, and implementing smoking restrictions. Consequently, schools and workplaces serve as prime locales for public health interventions to promote healthier lifestyles.

The larger **community**—the fourth level—defined in this context as the culmination of various organizations in a specified area, can significantly influence behavior. Organizations can work together in a community to jointly promote healthy goals. Understanding community organizations and networks can offer insights into promising avenues for health promotion. For example, churches are the social centers for many Black and rural communities and may provide a focal point for health-related interventions. Conversely, community factors may sabotage public health efforts to promote healthy behavior. In the South, where tobacco is a pillar of local economies, public health advocates may find it difficult even to raise the issue of the health consequences of using tobacco.

The fifth level—**public policy**—encompasses the regulations and limitations on behavior discussed previously. These are the most explicit and controversial measures that local, state, and national governments take to promote healthy behaviors. Such measures include tobacco smoking restrictions, age limits on alcohol sales, seat belt laws, and other laws designed to prevent injury and illness and promote health.

2.2 Lifecourse Perspective

Health outcomes frequently arise from accumulating exposures throughout an individual's lifespan. These exposures, from early childhood to older adulthood, encompass

various factors influencing health trajectories. From prenatal conditions impacting fetal development to **socioeconomic status (SES)**—a way of describing an individual based on their income, employment status, type of employment, and education—affecting access to health care and resources for optimal health (food, physical activity, safe living conditions), each life phase presents distinctive exposures contributing to an individual's health status. For example, during adolescence, behaviors such as dietary choices and decisions regarding tobacco or substance use are commonly referred to as "**lifestyle choices**." However, in many instances, these seemingly voluntary "choices" result from various exposures. An example is the research demonstrating that tobacco use by parents is a significant contributor to youth tobacco smoking, leading to the intergenerational transmission of tobacco use and dependence.^{2,3} Additionally, occupational exposures and environmental factors play a significant role in adulthood, potentially affecting chronic disease risk.

The **lifecourse perspective** uses a timeline to illustrate life phases and to understand the distribution, causes, and consequences of illness and premature death in the population by examining the dynamic interplay of biological, behavioral, psychosocial, and environmental factors across an individual's life span.⁴ The lifecourse perspective recognizes that health is not solely determined by current behaviors or genetics, but is shaped by accumulated experiences and exposures over time. This perspective emphasizes the importance of considering critical periods of development, such as prenatal and early childhood stages, as well as the cumulative impact of exposures and experiences throughout adolescence, adulthood, and later life (**Figure 2-3**). Throughout the lifecourse, various factors can influence health outcomes. Early life conditions, including maternal health, prenatal care, and early childhood experiences, can set the foundation for lifelong health trajectories. Adverse experiences during these critical

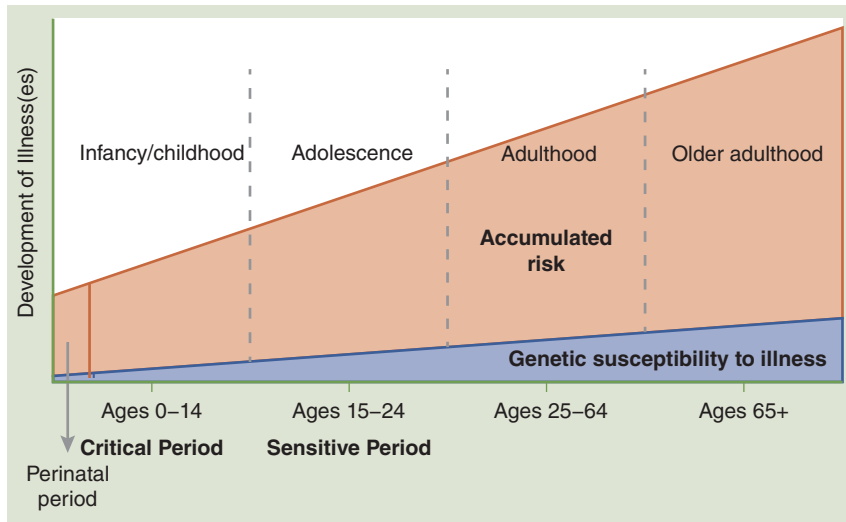


Figure 2-3 Lifecourse Perspective

Data from Uauy, Ricardo, and Noel Solomons: "Diet, nutrition, and the life-course approach to cancer prevention." *The Journal of nutrition* vol. 135, 12 Suppl (2005): 2934S–2945S. doi:10.1093/jn/135.12.2934S

periods may increase vulnerability to certain health conditions later in life.

Recognizing the cumulative nature of lifecourse exposures underscores the need to shift traditional approaches in public health interventions. It requires a shift from isolated, immediate individual-based interventions to comprehensive strategies that consider the interconnectedness of exposures over time. By adopting a lifecourse perspective, public health practitioners can tailor interventions to specific life stages, addressing current health challenges and preventing future risks. The lifecourse perspective acknowledges the significance of social determinants, environmental exposures, and lifestyle factors at different life stages, recognizing that the impact of these factors is not uniform across the entire lifespan.

2.3 The Social Determinants of Health

When contemplating the determinants influencing an individual's health and lifespan, it is widely acknowledged that behaviors and

habits play a crucial role in shaping the risk of disease and, in certain instances, premature mortality. Extensively researched and documented factors such as prolonged tobacco use, alcohol abuse, sedentary lifestyle, diets high in sugar and salt, and illicit drug use, as well as age and genetic predispositions, are recognized as contributors to illness. Nevertheless, the field of public health has expanded its focus beyond individual-level factors to consider the influence of structural, cultural, and economic conditions on health outcomes, often referred to as the **social determinants of health** (SDoH). Recognizing these broader determinants is essential, as they serve as the foundation, or "cause of causes," significantly impacting individuals' health, well-being, and overall quality of life.⁵ These determinants, encompassing economic stability, educational opportunities, social support systems, and the physical environment, collectively mold the health outcomes of populations. Socioeconomic disparities, for instance, contribute significantly to health inequalities. Limited access to quality education, employment opportunities, and stable housing creates a cascade of adverse effects, influencing health behaviors,

access to health care, and overall health status. The intricate web of social determinants accentuates the imperative for comprehensive public health strategies that extend beyond traditional healthcare interventions, addressing the root causes embedded within the broader social fabric. Healthy People 2030 provides a list of SDoH that include the following:

- Safe housing, transportation, and neighborhoods
- Racism, discrimination, and violence
- Education, job opportunities, and income
- Access to nutritious foods and physical activity opportunities
- Polluted air and water
- Language and literacy skills

SDoH also contributes to health disparities and inequities. For example, people who do not have access to grocery stores with healthier food options are at higher risk of diseases associated with dietary patterns like type 2 diabetes, heart disease, and obesity, and lower life expectancy relative to people with access to healthy foods. Another example is access to primary health care, which can identify disease symptoms early and increase treatment efficacy (an example of this being colorectal cancer). Still, healthcare costs and access issues can result in not receiving basic health care, leading to health inequities.

These determinants of health are not at the fault of the individual or the community most impacted.

People want access to healthier food options, clean water, and health care. However, simply promoting healthy choices or building more healthcare facilities will not eliminate these and other health disparities. Instead, public health organizations and their partners in sectors like education, transportation, and housing need to take action to improve the conditions in people's environments. In the United States, the multifaceted landscape of social determinants plays a pivotal role in shaping health disparities across diverse communities. Historically marginalized populations often grapple with disproportionate burdens stemming from injustices and systemic inequities. These disparities manifest in higher rates of chronic diseases, reduced life expectancy, and limited access to healthcare resources. Addressing the SDoH requires a holistic approach that integrates policies promoting economic equity, educational accessibility, and community empowerment. By acknowledging and actively mitigating these determinants, public health initiatives can strive toward fostering a more equitable and inclusive environment, ultimately contributing to the enhancement of overall population health.

Rethinking the London Cholera Epidemic: 1834–1835

One of the most notable historical events frequently referenced in public health literature is the cholera outbreak that unfolded in London during 1853 and 1854. This event serves as a compelling illustration of the early applications of epidemiologic methods aimed at controlling and preventing the spread of diseases. Dr. John Snow, a prominent British physician, meticulously documented cholera cases and fatalities on a map within the Soho area of London—a primitive form of a geographic information system (GIS). This approach was instrumental in investigating and discerning the probable causes of disease transmission and death. Snow's insightful analysis pinpointed the epicenter of the epidemic: a water well located on Broad Street.

However, it is imperative to reconsider the narrative surrounding the outbreak. Beyond attributing this event solely to Dr. Snow's pioneering public health investigative work, it is equally crucial to delve into the broader determinants, aptly termed "the cause of causes" by Braveman and Gottlieb, that rendered London susceptible to an epidemic at that time.⁵ SDoH encapsulate the influential role of societal factors such as income, community safety, access to well-funded education, proximity to healthcare services, and employment opportunities, all intricately linked

to health outcomes. Examining the case of Broad Street reveals compounding factors like overcrowded and substandard housing; inadequate waste disposal systems, including direct sewage drains into the Thames River; and a lack of public health campaigns aimed at educating the populace about proper waste disposal practices, particularly for baby excrement. Although Snow's investigation and the subsequent removal of the water pump handle, identified as the source, effectively curtailed the cholera epidemic, it is imperative to recognize that the root "cause" extended beyond the water well to encompass broader aspects of decision making and living conditions.

Poverty exerts a profound and multifaceted influence on health outcomes in the United States, presenting a persistent public health challenge. Individuals residing in impoverished communities often face limited access to essential resources such as nutritious food, quality health care, and safe housing. These **structural determinants** contribute to an increased prevalence of chronic health conditions, as well as higher rates of infectious diseases. Moreover, economic disparities exacerbate mental health issues, as the stressors associated with financial instability and limited opportunities can contribute to heightened levels of anxiety and depression within impoverished populations. The socioeconomic gradient is starkly evident in health disparities, with individuals grappling with poverty experiencing higher mortality rates and reduced life expectancy compared to their more affluent counterparts.

Furthermore, the impact of poverty on health extends beyond individual well-being, affecting community health. Insufficient access to healthcare services, preventive measures, and health education perpetuates a cycle of poor health outcomes, particularly among vulnerable populations. Addressing the intricate interplay between poverty and health requires a comprehensive public health approach that involves targeted interventions to alleviate economic disparities, improve social determinants, and foster equitable access to healthcare resources. By implementing evidence-based strategies to mitigate the health implications of poverty, public health professionals can contribute to building a more resilient and

inclusive society that prioritizes the well-being of all its members.

Groups with the lowest SES have the highest mortality rates, a relationship that holds in many different countries and has been true for centuries for reasons known and unknown. In London in 1665, the poor were more likely to die during the plague epidemic because of poor nutrition and sanitation and because they could not flee the city to escape infection as the wealthy did. In the United States today, the health of people experiencing poverty is threatened by adverse environmental conditions, such as lead in paint and tap water, air pollution, and violence. People living under the federal poverty line also have poorer nutrition, less access to medical care, and more psychological stress.

It is not just the effects of poverty that account for socioeconomic variations in health. The association is seen at all levels of the socioeconomic scale, with the very rich being healthier than the rich, who report better health outcomes than the middle class, and so on. In a study of British civil servants called the Whitehall Study, researchers compared mortality rates over 10 years across four employment grades. Top administrators were compared with executives, professionals, clerical staff, and unskilled laborers.⁶ As seen in **Figure 2-4**, higher employment status was associated with a lower risk of dying.

Part of why people with higher SES are healthier seems to be that people with more education adopt healthier behaviors. For example, in 2018, 21.8% of Americans with a high school education or less smoked tobacco,

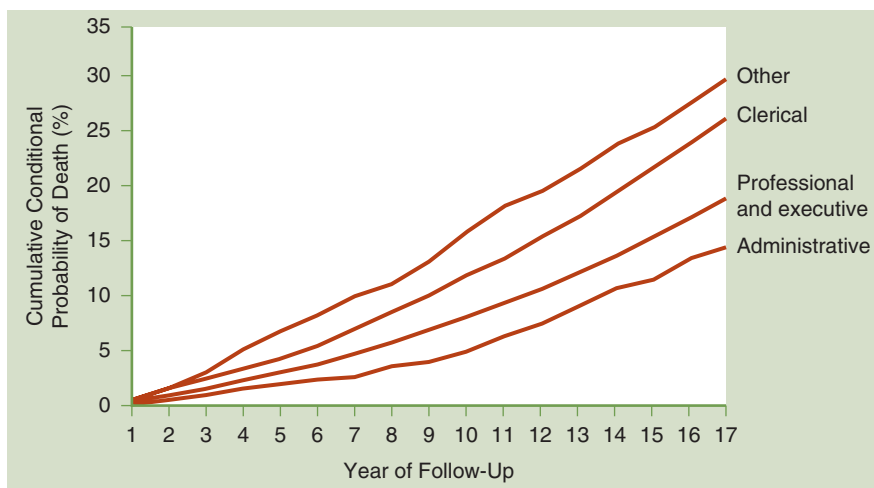


Figure 2-4 Mortality from All Causes by Year of Follow-Up and Grade of Employment, in Whitehall (U.K.) Male Civil Servants, Initially Aged 40–64

Data from M. G. Marmot et al., "Inequalities in Death—Specific Explanations of a General Pattern?" *The Lancet*, 323 (1984): 1003–1006.

while of those with at least a bachelor's degree, only 7% smoked tobacco.⁷ Americans with more education were also more physically active.⁸ Similarly, the Whitehall Study questioned U.K. subjects about their habits and found that those in higher employment grades were less likely to smoke tobacco and more likely to exercise and eat a healthful diet that included whole grains and fresh fruits and vegetables.⁶ Likewise, there is a strong link between SES and drug abuse, both illicit drugs and prescription drugs. The opioid crisis of the last decade is concentrated among Americans with less education, who are less likely to have ever been married, who have lower SES, and who are more likely to be out of the workforce.

Variable access to medical care is another factor blamed for some of the socioeconomic differences in health. In the United States, where 9.6% of adults—mostly those in low socioeconomic groups—lacked health insurance in 2022, it was often argued that universal health insurance could reduce health inequalities.⁹ However, the SES differences in mortality are also seen in Britain, Scandinavian nations, and other countries with national health programs. The British civil servants in

the Whitehall Study all had the same medical coverage by the National Health Service. Yet, the mortality risks were still higher at lower employment grades, even when behavioral factors were considered.

2.4 Stress and Social Support

Several psychological factors have been found to influence health, some of which may have a role in the health effects of SES. One of these factors is **stress** due to the adverse physical and social conditions associated with lower SES. Stress may act both directly, by affecting physiologic processes, and indirectly, by influencing individual behavior. Early evidence of the health effects of stress came from observations that widows and widowers seemed to have an unusually high risk of dying soon after the death of their spouses. Several studies in the 1960s and 1970s found that mortality rates of survivors were 40% to 50% higher during the 6 months after the death of a spouse compared to the mortality of married people of the same age. These

studies were expanded to include the effects of other stressful life events, such as the death of other family members, divorce, and loss of a job, all of which were found to increase the risk of illness or death.¹⁰

Stress is well established as a contributor to heart disease, a relationship that has been demonstrated in a variety of epidemiologic studies. A compelling example is a study that investigated the relationship between psychological stress and cardiovascular disease risk. Utilizing a case-control design, the researchers compared individuals diagnosed with cardiovascular disease to healthy controls, assessing their levels of psychological stress. Their findings suggest that psychological stress may indeed be a significant risk factor for CVD, highlighting the importance of considering factors like chronic stress in cardiovascular health assessments and interventions.¹¹

Experiments on animals ranging from rats to baboons have found that various psychosocial stresses induce physiologic changes such as decreased immune response and increased atherosclerosis. An experiment on humans demonstrated that stress also suppresses the immune response in humans. In that experiment, investigators measured levels of psychological stress in 420 healthy volunteers, then administered nasal drops containing cold viruses to all but a small control group. They found that the subjects with higher stress levels were more likely to be infected with cold viruses and more likely to develop colds, with symptoms including sneezing, coughing, eye watering, nasal discharge, sore throat, and increased use of tissues.¹² A whole new field of research called psychoneuroimmunology has arisen to study the impact of stress on health.

Lower SES exposes people to greater life stress for many reasons. Daily hassles are greater at lower levels on the SES hierarchy: Cars break down, landlords complain about late rent checks, unreliable childcare, and banks punish people for falling on hard financial times. Members of racial and ethnic

minority populations may be exposed to incidents of racial prejudice. These constant stresses may be as debilitating as such major life events as deaths in the family. Chronic exposure to stressful situations can have physiologic consequences, causing or worsening illnesses and increasing the use of health-compromising behaviors in an attempt to adapt. These effects are known as **allostatic load**, and the development of allostatic load negatively impacts healthy body functioning and results in overactive stress response systems.^{13,14} By comparison, higher income and education provide resources that help buffer the impact of life's hassles, thereby protecting health.

A number of factors can help people cope with life's stresses. Money, of course, can solve a multitude of problems. Education is important because it provides the information and skills to solve problems. The **social support** of family and friends can also help by providing both emotional and instrumental assistance. In fact, social support has proven to be surprisingly significant in determining an individual's health.

Early evidence for the influence of social support on health came from an epidemiologic cohort study conducted on residents of Alameda County in California. Persons aged 30 to 69 were surveyed in 1965 on their physical, mental, and social well-being as well as their health-related habits, such as exercise and the use of cigarettes and alcohol. They were also asked about their social networks, such as marital status, number of close friends and relatives, church membership, and affiliation with other organizations. Death certificates were then monitored over the next 9 years to assess mortality rates, and, in 1974, a follow-up survey was conducted on survivors to assess their health status.¹⁵

The study, as expected, found a strong association between certain unhealthy behaviors and higher mortality rates. More surprisingly, the study found that an individual's health status and risk of dying were strongly associated with the extent and nature of their

social network. This was true for both men and women and individuals of high SES and low SES. The association remained true even after unhealthy behaviors were taken into consideration. Across the socioeconomic spectrum, men and women with few social contacts had mortality rates two to three times higher than their counterparts with many social connections.

Many more recent studies have supported the conclusions of the Alameda County study. A review of 148 studies on the health effects of social relationships found much lower mortality rates for people with strong social connections. The association is held regardless of age, gender, or preexisting conditions.¹⁶ Why social support should have such a broad and consistent effect on health is not well understood, but it may act through one or more of the following channels. First, it may help buffer stress through emotional or other support from close social contacts, including hormonal responses to that support. Second, it may act through indirect channels such as having peers who model healthy behavior or, through belonging to a group, help establish norms for self-care. Third, social connections may help establish a better sense of purpose, well-being, and self-esteem.¹⁶ A better understanding of the relationship between social support and health may come from research in the field of psychoneuroimmunology, which seeks to learn about the mind-body connection as it relates to the immune system.

2.5 Health of Racial and Ethnic Minority Populations

Race and ethnicity have been seen to profoundly affect health in the United States. Most data on the health status of different population groups show that the health of Black Americans, the largest racial minority,

constituting 12% of the population, is poorer than that of White Americans. Hispanic people (classified as an ethnic group rather than a racial group by the United States Census) are heterogeneous, and their health status varies among different subgroups. American Indian/Alaskan Natives (AI/AN) generally have poorer health indicators than White people do, while Asian Americans have better health status.

While the overall health of the U.S. population has improved over the past decades, health disparities among racial and ethnic groups have persisted. Life expectancy at birth in 2021 was 76.4 years for non-Hispanic White people, 70.8 years for Black people, and a staggering 65.2 for AI/AN people.¹⁷ The infant mortality rate of Black people was almost double that for White people, and the rate for AI/AN was 1.5 times higher than that of White people.⁶ Mortality from diabetes is 27% higher for Black people compared to White people, and 49% higher for AI/AN compared to White people.¹⁸ Despite overall infant mortality declining in the United States, a significant disparity still remains between non-Hispanic White and Black infants, with Black infants being twice as likely to die before their first birthday.

COVID-19 highlighted racial and ethnic health disparities in the United States. The Centers for Disease Control and Prevention (CDC) published data showing that people from minority racial and ethnic populations were at higher risk for COVID-19 infections, hospitalizations, and death compared to their non-Hispanic White counterparts. There were also race and ethnicity disparities when it came to COVID-19 vaccination rates, with large gaps in vaccinations for Black and non-White Hispanic populations, some of this due to mistrust of the medical system and a lack of vaccines being distributed to poorer communities.¹⁷

The health disparities may be accounted for in part by the lower SES of Black people,

who live in households with median incomes approximately \$22,000 less than the U.S. average.¹⁹ More than 17% of Black people were living in poverty in 2022, as compared with 8.6% of non-Hispanic White people.²⁰ Black people have less education, on average, compared to White people, and they have higher unemployment rates. The reasons for the socioeconomic disparities are complex and somewhat inaccessible to public health interventions. Moreover, the relationship between SES and health is not entirely understood. Nevertheless, public health must find ways to improve the health of groups that have been historically disadvantaged economically, educationally, and politically.

Public health interventions aimed at improving the health of minority groups include efforts to influence their health behaviors. These efforts begin with attempts to understand which factors influence health and health behavior, how these factors may affect people of various ethnic and racial groups differently, and which types of interventions can effectively modify these factors.

2.6 Psychological Models of Health Behavior

Although public health does not have much power to change people's SES, stressful life events, or social networks, understanding how these factors affect health is hoped to permit more effective interventions to promote healthier behavior. With this goal in mind, social and behavioral scientists have proposed various theories and models attempting to explain how psychosocial factors affect health-related behavior. Some of these theories focus on individual psychology, whereas others try to explain the effects of the social environment on individual behavior. These analyses aim to understand the most effective ways to promote healthier behavior.

Health Belief Model

The **health belief model** is the classic frame of reference for understanding health behavior, especially behavior change. Assuming that people act in rational ways, the health belief model specifies several factors that determine whether a person is likely to change behavior when faced with a health threat: (1) the extent to which the individual feels vulnerable to the threat, (2) the perceived severity of the threat, (3) perceived barriers to taking action to reduce the risk, and (4) the perceived effectiveness of taking action to prevent or minimize the problem (**Figure 2-5**).²¹

Based on the health belief model, the public health approach to changing behavior would be to convince people that they are vulnerable, that the threat is severe, and that certain actions are effective preventive measures. For example, surveys of low-income minority women who had not had mammograms found that many had misperceptions about breast cancer, with some women underestimating their susceptibility to breast cancer (factor 1); others were embarrassed or afraid of the pain or radiation involved in a mammogram (factor 3); and others felt that cancer was not curable, so there would be no point in diagnosing it early (factor 4). Screening rates among these women could be improved by counseling that included personally tailored messages that addressed the women's beliefs and concerns.²¹

Another important concept in understanding health behavior is **self-efficacy**, the sense of having control over one's life. People who are confident that they can control their lives are said to have high self-efficacy. Conversely, people who believe their lives are subject to chance or external forces are said to have low self-efficacy. Self-efficacy is often added as a fifth factor in the health belief model. People are more likely to adopt healthy behavior if they are confident that they can do so.²¹

A sense of control is beneficial for health in many ways. Clearly, it reduces stress. Some

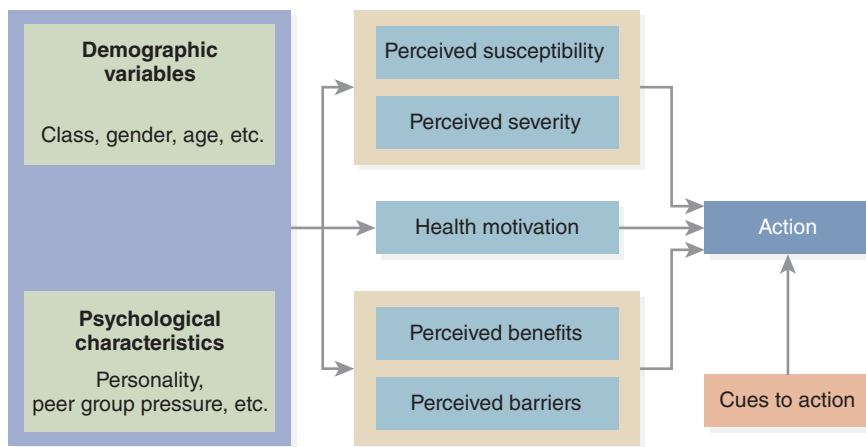


Figure 2-5 The Health Belief Model

studies in both humans and animals have shown that an individual's perception of the stressfulness of an adverse event can be reduced by two factors: knowledge of when the stressful event will occur and the ability to regulate the timing and intensity of the event. This knowledge and ability give the individual a sense of control or self-efficacy. The lowest self-efficacy is seen in people (or animals) who have experience of being unable to avoid noxious events, especially if they have repeatedly tried and failed. They may develop a pattern of “learned helplessness”—a pattern described as a “numbed acceptance of a negative situation, so that an individual no longer tries to change that situation for the better because he or she does not expect those efforts to make any difference.”^{22(p.44)} Several studies have shown that people with high self-efficacy are more likely to engage in health-promoting behavior than those with low self-efficacy. An attitude of learned helplessness is common in people who have repeatedly tried and failed to quit smoking or lose weight.

A great deal of research has been focused on how to increase people's self-efficacy, thereby motivating them to practice healthy behaviors. An individual's self-efficacy is

increased by previous successful performance of the behavior in question. It may also be increased by seeing others successfully perform the behavior, especially if the observed behavior is performed by someone like themselves. For example, the most successful school drug prevention programs include role-modeling, small-group exercises, and skills practice to teach students how to identify and resist internal and external pressures to use drugs. These programs are much more effective in enhancing students' self-efficacy to resist drugs if they are led by older teens, with whom they can identify, rather than by adult health educators.²³

Transtheoretical Model

A theory that has proved widely helpful in health education is the **transtheoretical model** (also referred to as the stages of change model), which envisions change—for example, smoking cessation or adopting a healthy diet—as a process involving progress through a series of five stages: precontemplation, contemplation, preparation, action, and maintenance (**Figure 2-6**). People in the precontemplation stage have no intention to

The Transtheoretical Model (Stages of Change)

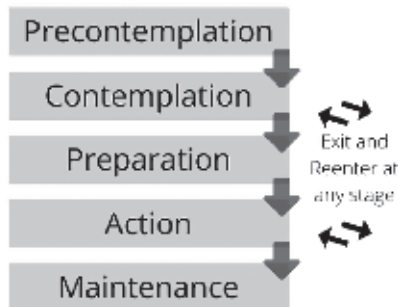


Figure 2-6 The Transtheoretical Model (Stages of Change)

Conde S, Elor A, Mateas M and Kurniawan S (2023) Acculturative game design with Latine communities: a bridging review on acculturative stress, behavior change, and serious games. *Front. Educ.* 8:1231907. doi: 10.3389/feduc.2023.1231907

change their behavior; the first step in getting them to change involves consciousness-raising to increase their awareness that their behavior is unhealthy and should be changed. During the contemplation stage, the person is more aware of the benefits of change but also very aware of the difficulties and barriers to change and is still not ready to act. The third step is preparation, when a person has decided to make the change and has planned concrete actions they could take, such as signing up for a class, discussing the plan with a physician, or buying a self-help book. The fourth step, action, requires that individuals actually modify their behavior by abstaining from smoking or adhering to a healthier diet. Finally, maintenance is the stage in which people have achieved healthier behavior but must strive to prevent relapse.²⁴ Knowing which stage an individual has reached can help a physician or health educator move them along to the next stage.

The health belief model and the transtheoretical model are not contradictory; instead, they are alternative ways of looking at what may be the same psychological factors. Both models can help design public health messages aimed at changing behavior.

2.7 Theories in Public Health Practice

As social and behavioral scientists gain a better understanding of how people's behavior is affected by their own beliefs and by the various levels of influence in their social environment, theories such as the health belief model and the ecological model are being used to design more effective public health and disease prevention programs. A good example is provided by an acquired immunodeficiency syndrome (AIDS) prevention program prioritizing men who have sex with men (MSM) in San Francisco in the mid-1980s.²⁵ Prevention of infection through behavior change was, and still is, the most effective approach to AIDS control because there is as yet no biomedical solution to the problem—no vaccine and no proven cure.

In the 1980s, San Francisco was the city with the second-highest number of AIDS cases in the United States. Most of the cases occurred in MSM, and the primary means by which the virus was transmitted was by sexual intercourse between men. Almost as soon as this relationship was understood, the city health department launched a prevention campaign in collaboration with community-based AIDS organizations and a research group from the University of California. They mounted an intensive media effort to inform at-risk individuals about the practice of safer sex. However, researchers understood that merely providing knowledge was insufficient to change people's behavior. By interviewing small groups of MSM, they identified key beliefs that must be addressed to convince the target population to act on the message.

This approach combined elements of three earlier theories: the health belief model, self-efficacy, and the ecological model. The campaign's goals were to promote the following beliefs among high-risk individuals:

- Belief in personal threat (i.e., "I am susceptible to infection.")

- Belief in response efficacy (i.e., “There is something I can do that will lessen the threat of infection.”)
- Belief in personal efficacy (i.e., “I am capable of making these changes.”)
- Belief that new behaviors are consistent with group norms (i.e., “My peers support new behaviors.”)²¹

The first belief was relatively easy to achieve because of the extensive publicity about AIDS in the general media. Queer and gay-specific news and entertainment media, including newspapers, comic books, and leaflets, as well as telephone hotlines, could be used to focus more on the second and third beliefs. Queer and gay organizations held small group training sessions to teach skills in the use of condoms as well as interpersonal communication skills, such as the ability to negotiate safer sex practices with prospective sex partners; this helped to enhance perceptions of self-efficacy among those at-risk. To achieve the fourth belief, messages sought to encourage the perception that low-risk behaviors could be pleasurable and satisfying.

The first three elements of the campaign focused on individual health beliefs and self-efficacy, whereas the fourth element addressed interpersonal and community influences. The campaign targeted community influences by providing educational programs for bartenders in establishments frequented by MSM. Condoms were made widely available in bars and small-group meetings and were distributed by volunteers on street corners. Through public policy, the government’s level of influence was addressed by the city’s provision of free, confidential testing for human immunodeficiency virus (HIV) antibodies. Because public bathhouses were frequent sites of high-risk behavior, the city government faced pressure to close them, as was done in New York City. However, the campaign was so successful in changing the behavior of MSM that business at the bathhouses fell off, and public

health officers were satisfied with merely posting warnings to the clientele about safe sex.²⁶

The San Francisco AIDS prevention program was highly successful. Surveys done between 1984 and 1988 found that MSM had dramatically reduced their high-risk sexual behaviors during that period. For example, the percentage of men who reported engaging in unprotected receptive anal intercourse—the behavior most likely to transmit HIV—fell from 44% to 3% over the 4 years of the study.²⁷

The early success of AIDS prevention programs among MSM, in the rest of the United States as well as in San Francisco, was primarily attributable to the fact that the queer and gay community was, in general, formally educated and politically astute. The epidemic’s potential victims tended to be of high SES, motivated to preserve their health, and able to mobilize resources to cope with the impending threat. Thus, they were more receptive to the health promotion campaign than other groups at risk for HIV. Unfortunately, the initial success in reducing high-risk behavior has not been maintained over time. Ongoing studies of MSM in San Francisco found that the prevalence of unprotected anal intercourse had increased from 31% in 1998 to approximately 60% in 2014 and held steady at that level through 2018.²⁸⁻³⁰ Nevertheless, the rate of new HIV cases among gay men fell every year between 2012 and 2018, from about 350 new cases in 2012 to about 150 new cases in 2018.³⁰

Public health workers attribute the resurgence of high-risk sexual behaviors to the advent of highly active antiretroviral therapy in 1995. Because of the remarkable effectiveness of the new drug treatments, many younger MSM saw HIV infection as a less severe threat (a factor in the health belief model) than did older gay men. The total number of infected individuals continued to increase until 2014 but has held steady since then due to the balance between infected individuals now living longer because of therapy and the declining number of new infections.³⁰

In other parts of the United States, different approaches may be necessary to reach high-risk groups. For example, among Black people—the population with the highest prevalence of HIV—MSM often do not identify as gay. Thus, prevention messages targeted at them might need to differ from those used in San Francisco.³¹ A large number of studies have been done on behavioral interventions for HIV prevention and their effectiveness in reducing risky sexual behaviors. Evidence has shown the efficacy of individual person-to-person counseling, group-level programs that include a skill-building component delivered by other MSM, and, to a lesser extent, community-level programs that can motivate and reinforce behavior change. There is little evidence, however, on how to reach racial and ethnic minority MSM who do not regard themselves as part of the gay community. Other high-risk groups that need targeted programs include Black women, who may be at risk of infection because of heterosexual intercourse with bisexual Black men, and intravenous drug users.

Unfortunately, health promotion and disease prevention programs cannot be done once and for all. They must be repeated for every generation and every new at-risk group. Currently, San Francisco is facing a drug crisis with deaths due to the misuse and overuse of opioid pain killers and heroin. San Francisco has twice as many drug-related deaths compared to the U.S. average. Given its history of using public health strategies to try to control a regional epidemic, policymakers and public health professionals have implemented harm-reduction programs to try to mitigate the drug problem and reduce the spread of disease due to injection drug use.

2.8 Changing the Environment

As more is learned about what influences people to behave the way they do, many advocates believe that public health programs, to

be effective, must concentrate less on individual behavior and more on changing the environment—both the social environment and the physical environment—to make it easier for people to behave in healthy ways. For example, fewer deaths occur from motor vehicle crashes now than three decades ago. This public health success comes less from educational programs about safe driving than it does from the safer design of highways and automobiles.

Similarly, the San Francisco HIV researchers suggested that social biases against homosexuality might contribute to the AIDS epidemic. They proposed that recognition of same-sex marriage might encourage more stable relationships among lesbian, gay, bisexual, transexual, and queer (LGBTQ+) individuals, reducing the number of sexual partners by everyone, and thereby reduce the individual's risk of being infected. Public policy affects the risk of HIV infection among intravenous drug users by providing access to needle exchange programs, which are illegal in some communities. Now we have access to pharmaceutical drugs such pre-exposure prophylaxis (PrEP), which can be taken prior to high-risk sexual activity to reduce the risk of the transmission of HIV. Yet many people are unaware of how to access this medication or could be fearful of talking to their doctors if they live in an area where same-sex relationships are still stigmatized.

Environmental factors influence people's diet and activity patterns, which are critical factors in Americans' poor health. The government recommends that people eat five to nine servings of fresh fruit and vegetables daily, but educating people in poor areas will not help improve their diets if they do not have access to supermarkets or produce stands. Similarly, federal policies that have favored a suburban lifestyle since World War II must bear much blame for Americans' lack of exercise: People live in their cars because most places are not within walking distance.

The environmental perspective forces people to think of public health problems as

social and political issues that require collective action. Instead of blaming smokers for lack of willpower, public opinion has shifted its focus to the tobacco industry and the enormous resources the industry has put into making its products attractive to young people, a way of thinking that has led to a remarkable change in public attitudes toward smoking. People are now acting against the tobacco industry, as Black activists did against the alcoholic beverage industry when it began aggressively marketing high-powered malt liquors to young Black males.³² This approach may lead to confrontations with very powerful economic interests, and it will not always be successful. However, having whole communities become involved has the potential to be the most effective way to bring about major changes in health and behavior.

The early successes of public health, in its mission to prevent death and disability, often came from focusing on specific diseases or groups of diseases, seeking particular causes, and finding ways to interrupt the cause-and-effect relationships. This approach was validated during the 20th century by victories

over infectious diseases. Public health professionals learned to break the chains of infection, most often by removing etiologic agents (bacteria, viruses, parasites) from the environment (water, food) or by developing vaccines to immunize potential hosts.

As infectious diseases were brought under control and chronic diseases became more significant as causes of death and disability, it became increasingly apparent that the challenges faced by public health regarding chronic diseases would be more complex. Consider the leading causes of death in the United States in 1900 (Table 2-1) versus 2021 (Table 2-2). Despite decades of biomedical research, there are no vaccines or environmental solutions to the problems of most cancers and heart disease.

In 1990, a group of public health experts from the CDC looked at the data differently. They observed that the leading causes were not, in fact, root causes, but were merely the diagnoses identified at the time of death. These diseases result from a combination of genetic and external factors. The panel of experts undertook to identify, where possible,

Table 2-1 Leading Causes of Death in the United States, 1900

Cause	Number of Deaths	Percentage of All Deaths
Pneumonia and influenza	40,362	11.8
Tuberculosis (all forms)	38,820	11.3
Diarrhea, enteritis, ulceration of intestines	28,491	8.3
Diseases of heart	27,427	8.0
Intracranial lesions of vascular origin	21,353	6.2
Nephritis	17,699	5.2
All accidents	14,429	4.2
Cancer and other malignant tumors	12,769	3.7
Senility	10,015	2.9
Diphtheria	8056	2.3

Data from National Center for Health Statistics, "Leading Causes of Death, 1900-1998," www.cdc.gov/nchs/data/dvs/lead1900_98.pdf, accessed September 21, 2019.



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