



THIRD EDITION

INTRODUCTION TO
**GLOBAL
HEALTH**

Kathryn H. Jacobsen

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Preface

The first and second editions of *Introduction to Global Health* were written during the Millennium Development Goals (MDG) era of global health. The MDGs spelled out an ambitious plan for significantly reducing global poverty between 2000 and 2015. They were wildly successful. The number of people living on less than \$1 per day dropped substantially during the first 15 years of the 21st century. As a growing number of global health partnerships set agendas for change and financed action plans, significant progress was made toward alleviating hunger, preventing maternal and child mortality, and controlling HIV/AIDS and malaria.

The next generation of global goals—the Sustainable Development Goals (SDGs)—were launched at the end of 2015. They spell out 17 goals for enhancing human flourishing by 2030, including targets related to poverty reduction, hunger, health, education, gender equality, clean water and sanitation, affordable and clean energy, decent work, infrastructure and technology development, human rights, sustainable urbanization, responsible production and consumption, climate and environment, peace, and governance. The SDGs seek to promote prosperity while upholding human rights, protecting the planet, and fostering peace and security. All of the goals are interdependent, and all are inextricably tied to health. Improvements in any of the 17 areas will yield benefits for population health, and improvements in public health will enable other SDGs to be achieved.

Most of the MDGs were targeted at improving quality of life among the world's poorest people. The SDGs retain those aims but add a lengthy list of objectives that apply to countries

across the income spectrum. For example, the SDGs include targets for preventing new hepatitis B virus infections; reducing the number of adults who die from cardiovascular diseases, cancers, and other noncommunicable diseases before their 70th birthdays; reducing the suicide mortality rate; increasing access to treatment for substance use disorders; and reducing deaths from road traffic injuries and violence. These conditions affect people in every country, and all countries have the opportunity under the SDGs to track their progress toward improving health metrics related to these concerns.

This third edition of *Introduction to Global Health* is a book for the SDG era. The socioeconomic and environmental determinants of health are presented in the context of the SDGs. The shifting landscape for financing and implementing global health initiatives is described in expanded chapters on payers and players. Chapters on infectious diseases, reproductive health, and nutrition are complemented by new chapters on noncommunicable diseases, mental health, and injuries. The similarities and differences in the conditions that cause illness and death in featured countries representing diverse world regions and income levels are illustrated with estimates from the Global Burden of Disease (GBD) project, which now produces annually updated profiles of health status in every country. (Disclosure: the author is a GBD collaborator.) The global health agenda has expanded to cover all of the world's people, and this book provides a positive, forward-looking perspective on the numerous actions that are helping promote the health, well-being, and security of people across the lifespan and across the globe.

New to This Edition

The third edition of *Introduction to Global Health* has been significantly expanded to include more comprehensive coverage of the full spectrum of topics that now constitute part of the global health agenda.

Chapter 1 presents a new model for identifying global health issues—one that incorporates populations, action, cooperation, equity, and security—and it introduces the key concepts of prevention science, health transitions theory, globalization, and global health security.

Chapter 2 introduces the new Sustainable Development Goals (SDGs) that will guide international development efforts through 2030 and describes the most commonly used global health metrics.

Chapters 3 and 4 use the SDGs as a framework for exploring the social and environmental determinants of health. Chapter 3 describes the connections between health and economics, education, gender, employment, culture, migration, and governance. Chapter 4 examines the links between health and water, sanitation, energy, air quality, occupational and industrial health, urbanization, sustainability, and climate change.

Chapter 5 uses the SDGs and the Universal Declaration of Human Rights to highlight some of the major ethical issues in global health, including questions about the right to have access to healthcare services and medicines, humanitarian responsibilities after natural disasters and during times of conflict, and the rights of people in prison, people with disabilities, and other special populations.

Chapter 6 is a new chapter that describes the health system models used in various countries and explains the funding mechanisms used to pay for global health activities. Chapter 7 features the diversity of entities involved in implementing and evaluating global health interventions, including governmental and intergovernmental agencies, nonprofit organizations, and for-profit corporations.

Chapters 8 through 17 present the health conditions that account for the greatest burden of disease globally. Each chapter begins with a section that explains why the featured topic is considered to be a global health issue, and each chapter emphasizes the interventions that can reduce the impact of adverse health conditions on individuals and populations. Health metrics from the Global Burden of Disease (GBD) collaboration are used to illustrate the populations affected by each condition.

Chapter 8 describes the global threats posed by HIV/AIDS, tuberculosis, and antimicrobial resistance. Chapter 9 discusses the heavy toll that child mortality from diarrheal diseases and pneumonia takes on low-income countries and describes the tools that are available to contain outbreaks of influenza and other vaccine-preventable infections. Chapter 10 describes the burden from malaria and neglected tropical diseases in low-income countries and the global threats associated with emerging infectious diseases. Chapter 11 highlights a diversity of reproductive and sexual health issues, including family planning, infertility, pregnancy, maternal mortality, neonatal health, men's health, and sexual minority

health. Chapter 12 describes the nutrition transition and the challenges associated with undernutrition, overnutrition, and food safety.

A series of new chapters describe the opportunities for global health initiatives to address the noncommunicable diseases (NCDs), mental health disorders, and injuries that are among the leading causes of death worldwide. Chapter 13 focuses on cancer, Chapter 14 focuses on cardiovascular disease, and Chapter 15 focuses on chronic respiratory diseases and diabetes. The principles of behavior change, tobacco control, and other methods for prevention and management of NCDs are highlighted. Chapter 16 describes the diversity of mental health conditions that contribute to global disease burden and emphasizes the need for greater access to mental health services. Chapter 17 discusses injury prevention and control methods.

Two chapters synthesize the core messages of the book through the lens of health promotion across the lifespan. Chapter 18 presents the major improvements in neonatal, infant, child, and adolescent health that were

achieved under the MDGs and the opportunities for continued progress under the SDGs. Chapter 19 describes the emerging challenges associated with aging populations and the opportunities for promoting healthy adulthood and aging.

Chapter 20 is a new chapter that describes the links between diverse educational and career pathways and global health, and emphasizes the opportunities for everyone to be involved in making communities and the world a healthier place for current and future generations.

More than 350 figures and tables highlight key material, and nearly all of these are new for the third edition. All of the statistics in the book have been updated. Data from eight of the world's largest countries, which collectively are home to half of the world's people, are used to illustrate the patterns of health status in high-income, middle-income, and low-income countries: Brazil, China, Ethiopia, Germany, India, Iran, Nigeria, and the United States. A new glossary provides definitions for more than 780 key terms in global health.

About the Author

Kathryn H. Jacobsen, MPH, PhD, is professor of epidemiology and global health at George Mason University. She is the author of more than 150 scientific articles as well as *Introduction to Health Research Methods: A Practical Guide*, also published by Jones & Bartlett Learning.

She is also a contributor to the Global Burden of Disease project and frequently provides commentary for print and television media.

CHAPTER 1

Global Health Transitions

Global health is a multidisciplinary, multisectoral field in which diverse partners from around the world act together to improve population and environmental health. Scientific advances during the last century have reduced infant and child death rates, increased the number of infectious diseases that can be prevented or cured, and provided new tools for managing the chronic diseases associated with aging. Global health activities can also be effective for promoting security, stimulating economic growth, fostering justice, and achieving other shared goals.

▶ 1.1 Defining Global Health

Health is often defined as the absence of disease or injury, but this is an incomplete explanation because the focus is on what health is not, rather than on what health is. Some definitions of health try to focus on the essence of health by emphasizing health as the ability to conduct normal daily activities. But that type of statement is also limited because the definition of “normal” varies from person to person. For example, some people assume that it is normal for an older person to have limited mobility and forgetfulness, but that is not true. Many older people are very active and mentally sharp, and many of those who have joint pain or memory loss could be helped by therapy and medication. Similarly, in many parts of the world, parents think it is normal for their children to have intestinal worms. This belief is also not true, and untreated worm infections significantly reduce the health, growth, and

school performance of millions of children worldwide.

A more comprehensive definition of health addresses both physical and mental health as well as the presence of a social system that facilitates health. The Constitution of the World Health Organization (WHO), written in 1948, defines **health** as “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.” This definition recognizes that health is not just a function of biology. Health stems from biology, psychology, sociology, and a host of other factors. Although there is almost no one in the world today who would be classified as having “complete” health according to the WHO statement,¹ this definition provides a target for medical and public health systems as they work together to promote the improved health status of individuals and communities.

An ideal health trajectory begins with a consenting adult becoming pregnant and that pregnancy leading to an uneventful full-term delivery of a healthy newborn. After birth,

the ideal health trajectory continues with that healthy infant growing into adulthood without experiencing serious infections, injuries, or illnesses, and that adult remaining healthy and active for many decades. Because everyone eventually dies, the ideal health trajectory ends in very old age with a gentle death that is not preceded by months or years of disability and pain. However, few people achieve this ideal pathway (FIGURE 1-1A). In very low-income communities, a large proportion of children are born with low birthweight and struggle with repeated bouts of infectious diseases like pneumonia and malaria, and many young women die in childbirth (FIGURE 1-1B).

No matter where a person lives, a combination of happenstance and health behaviors may reduce health status at various time periods over the life span. A healthy child may develop permanent physical impairments due to a serious car crash in adolescence, then have reduced health status from alcohol abuse in middle adulthood, and die from a heart attack before reaching retirement age (FIGURE 1-1C). Even when people live to be very old, they usually experience a

gradual decline in function and loss of independence prior to dying (FIGURE 1-1D). A diversity of medical, behavioral, social, economic, environmental, and other interventions and changes can help people make progress toward long, healthy life trajectories. Some of these actions are taken by individuals to improve their own health status, some are communal activities by families and neighborhoods, and some are large-scale initiatives that take place on a national or international scale.

Global health refers to the collaborative actions taken to identify and address transnational concerns about the exposures and diseases that adversely affect human populations. There are many different lenses that are used to identify global health issues (FIGURE 1-2). Epidemiologists and health economists may evaluate global health metrics and select the conditions that cause the majority of deaths, disability, and lost productivity worldwide. Physicians, nurses, and other clinical practitioners may see suffering that could easily be prevented or relieved and feel compelled to find ways to scale up the delivery of cost-effective solutions

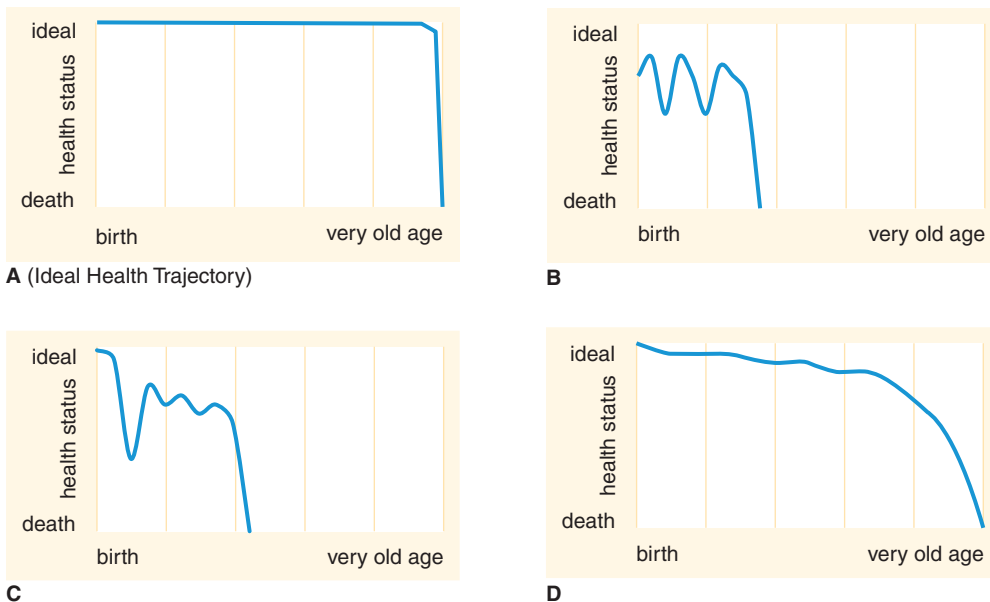


FIGURE 1-1 Examples of health trajectories.

Populations	A focus on the exposures and diseases that cause the greatest public health burden and affect large numbers of people in diverse geographic regions
Action	A focus on effective, low-cost interventions that prevent illness and injury, diagnose and treat diseases, and alleviate suffering
Cooperation	A focus on the health concerns that must be addressed through worldwide efforts to share knowledge, tools, and resources
Equity	A focus on helping the global poor and addressing social, environmental, and health inequalities
Security	A focus on addressing the health issues most likely to contribute to political and economic instability and conflict

FIGURE 1–2 PACES: Defining global health.

to people in need, no matter where those people live. Environmental health scientists may observe how quickly some pathogens and toxins cross international borders and recognize that international partnerships are necessary in order to mitigate those threats to health. Health promoters and others whose work is guided by a social justice perspective may focus on calling attention to the health needs of the most vulnerable people around the world. Security experts may zero in on the factors that contribute to instability and conflict. All of these global health lenses—ones focused on populations, action, cooperation, equity, and security (PACES)—emphasize transnational health issues, but

different global health priorities will emerge when different lenses are applied (**FIGURE 1–3**). These varied perspectives are why so many different environmental concerns, a broad range of diseases, and a diversity of special populations have been targeted by global health initiatives.

▶ 1.2 Health Interventions

Etiology is the study of the causes of disease, including both intrinsic (internal) causes, such as genetics and psychological factors, and extrinsic (external) causes, such as infectious disease and environmental exposures. A person's health status at a given age is a function of his or her experiences throughout the life course.² These biological, behavioral, and other exposures occur in particular natural and built environments, and they are also a function of a broad set of social, political, cultural, economic, occupational, and other factors.³ The diversity of contributors to disease means that a considerable diversity of changes can improve health.

Humans have long recognized the environment's role in disease etiology. For many centuries before microscopes allowed people to observe bacteria, communities recognized that some illnesses were linked to environmental exposures, and they took care to dispose of human waste, protect water sources, and bury the carcasses of diseased animals. During most of the 19th century, the term **miasma** was used to describe the pungent odors of poorly managed waste, and the prevailing theory of disease causation in Western countries was that epidemics were spontaneously generated in places with poor sanitation.⁴ When cholera outbreaks occurred in England in the mid-1800s, investigators found a higher infection rate in places of low altitude, especially places near marshes that had an abundance of foul-smelling gases, and they blamed the spread of cholera on contact with those offensive gases.⁵ This was

Lens	Sample Priority	Sample Priority	Sample Priority	Sample Priority
Populations	Cardiovascular disease (CVD)	CVD is the leading cause of adult mortality worldwide.	Drinking water	Unsafe drinking water causes billions of cases of severe diarrhea annually.
Action	Hunger	There is enough food in the world to spare children from the lifelong consequences of not having access to adequate nutrition during their early years of development.	HIV	HIV medications can extend the lives of infected individuals by many years or even decades.
Cooperation	Air pollution	Air pollution generated by one country can cause adverse health effects for its neighbors.	Drug-resistant infections	One country with poor regulations for antibiotic use can put the whole world at risk.
Equity	Neglected tropical diseases	The world's poorest children are disabled and disfigured by parasitic diseases that do not affect children who happen to have been born in higher-income places.	Mental health	People with mental health disorders in every country face stigma that may exclude them from full participation in society.
Security	Violence	The violence in conflict areas can spill over into new locations and create refugee crises.	Emerging infectious diseases	Outbreaks of deadly infectious diseases threaten public safety and can cause social, economic, and political instability.

FIGURE 1-3 PACES: Examples of global health priorities.

a reasonable conclusion because the people who lived in the gassy, marshy areas were the same people who drank the bacterium-infected water that was the true cause of the outbreak. Public health efforts in the 19th century focused primarily on environmental sanitation, with special attention aimed at reducing epidemics thought to be associated with urban

crowding and its associated grime.⁶ Although outbreaks are no longer blamed on miasmas, good hygiene (like frequent handwashing) and the avoidance of known environmental hazards remain very important for preventing infections and injuries.

By the middle of the 20th century, most medical scientists had shifted their efforts

from the identification of social and environmental risk factors for disease to the identification of specific infectious agents and genes.⁷ But even with the emphasis on immunology and genetics, one of the biggest public health breakthroughs in the 20th century was a series of studies published in the 1950s that confirmed that cigarette smoking was a major cause of lung cancer, emphysema, and cardiovascular disease.⁸ Later studies showed that exposure to secondhand smoke was an additional risk factor for lung disease.⁹ Today, health scientists and clinicians agree that there are many social and behavioral, environmental, and biological contributors to disease. This means that there are diverse actions that can improve health status. The particular set of interventions recommended for global health concerns tends to reflect the disciplinary perspectives of the people designing and implementing the interventions.¹⁰ Two of the most prominent voices in global health in the 21st century are medicine and public health.

Medicine focuses on preventing, diagnosing, and treating health problems in individuals and families. For thousands of years, various types of health practitioners in cultures across the globe have cared for people with health concerns, including herbalists adept at treating fevers, midwives skilled in delivering babies, and numerous other people equipped to provide physical and spiritual comfort to people with various ailments. As modern medical science has developed, clinical professionals like physicians, surgeons, nurses, dentists, psychologists, and physical therapists have developed highly specialized methods for caring for patients. Examples of common interventions in the medical field include antibiotics to treat infections, medications to manage chronic diseases (such as insulin for people with diabetes and inhaled bronchodilators for people with asthma), counseling to address mental health concerns, surgery to correct traumatic injuries, and physical therapy to restore function after an injury.

Public health focuses on promoting health and preventing illnesses, injuries, and early deaths at the population level by identifying and mitigating environmental hazards, promoting healthy behaviors, ensuring access to essential health services, and taking other actions to protect the health, safety, and well-being of groups of people (FIGURE 1–4).¹¹ Modern public health comprises a diversity of subdisciplines. **Environmental health** is the study of the connections between human

1	Monitor health status to identify community health problems.
2	Diagnose and investigate health problems and health hazards in the community.
3	Inform, educate, and empower people about health issues.
4	Mobilize community partnerships to identify and solve health problems.
5	Develop policies and plans that support individual and community health efforts.
6	Enforce laws and regulations that protect health and ensure safety.
7	Link people to needed personal health services and ensure the provision of health care when otherwise unavailable.
8	Ensure a competent public health and personal healthcare workforce.
9	Evaluate effectiveness, accessibility, and quality of personal and population-based health services.
10	Research for new insights and innovative solutions to health problems.

FIGURE 1–4 Essential public health services.

Reproduced from The public health system & the 10 essential public health services. Centers for Disease Control and Prevention website <https://www.cdc.gov/stltpublichealth/publichealthservices/essentialhealthservices.html>. Updated September 20, 2017.

health and environmental exposures, such as air quality, water quality, solid and hazardous waste, unsafe food, vermin and pathogen-transmitting insects, radiation, noise, and residential and industrial hazards. **Epidemiology** is the study of the distribution of health problems in populations, the risk factors for developing those conditions, and the effectiveness of interventions to address these concerns. **Biostatistics** is the science of analyzing health data and interpreting the results so that they can be applied to solving public health problems. **Health promotion** is an applied social science that encourages individuals and communities to take steps to improve their own health. The **Ottawa Charter** for Health Promotion was an international agreement sponsored by the WHO and approved at a conference in Canada in 1986 that identified the core health promotion actions as including healthy public policies, supportive environments, strong communities, skilled personnel, and expanded access to preventive health services.¹² There are also specialists in health policy and management, public health administration, health communication, maternal and child health, public health nutrition, health economics, and other public health fields. Examples of common public health interventions include policies that ensure that food and drinking water are safe, vaccination campaigns that prevent widespread outbreaks of infectious diseases, health education campaigns

that promote active lifestyles for people of all ages, and school nutrition programs that ensure that children have access to the nutritious food they need to grow and learn.

The lines between medicine and public health are blurry (**FIGURE 1-5**). Medicine tends to focus on the clinical care of individuals, while public health has a focus on larger populations. Public health usually emphasizes the prevention of health problems while medicine has more of a focus on treating the existing problems. But many people trained in clinical fields work in population health and provide preventive services (including public health nurses, physicians specializing in community medicine and preventive medicine, and others), and many people trained in public health are dedicated to increasing access to treatment for individuals with critical health issues. Medical research informs the design of public health interventions, and the information generated from public health research helps clinicians to make differential diagnoses, prescribe appropriate therapies, and encourage healthy lifestyles for their patients in addition to helping communities set their own public health priorities and design and evaluate evidence-based programs to address these issues.

In global health, an **intervention** is a strategic action intended to improve individual and population health status. Interventions take many different forms: detection and treatment of physical and mental health

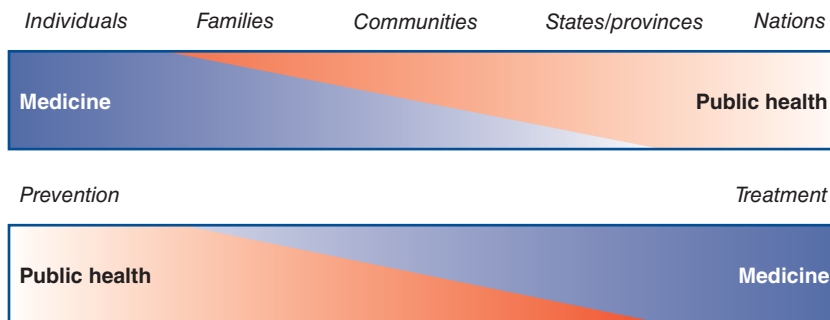


FIGURE 1-5 Comparing medicine and public health.

conditions, counseling and social marketing to promote healthier behaviors, development and enforcement of health policies, and numerous other actions.¹³ Interventions targeted at any level from the individual to the community, the nation, and the world can be effective at improving personal and public health. For example, nutrition support programs for pregnant and breastfeeding women can reduce the risk of low birthweight and malnutrition in infants, the use of antibiotics to treat childhood pneumonia soon after the onset of a cough can prevent life-threatening illness, the availability of skilled birth attendants can prevent women from dying during childbirth, and numerous other interventions during adulthood, such as injury prevention activities, mental health care, and lifestyle changes that reduce the risk of heart attacks, can improve both quality of life and the number of years lived (FIGURE 1-6). Together, these interventions can have a strong positive impact on an individual's health, allowing a person who might otherwise have been in poor health in childhood and died young to instead have a healthy childhood and live to old age. When these interventions reach millions of people, they make a huge difference in population health, happiness, and productivity.

Because individual and community health status is the result of a complex mix of biological, socioeconomic, environmental, and other factors, the clinical disciplines and public

health cannot on their own accomplish global health goals. People working in a diversity of fields make important contributions to the conditions that promote or inhibit the health of individuals and communities. Social workers, spiritual advisors, teachers, sanitation workers, farmers, scientists and engineers, policymakers and lawyers, a variety of government officials, and many others all have a role to play in the big-picture interventions that enable health.

▶ 1.3 Prevention Science

The adage that prevention is better than a cure expresses one of the foundational principles of global health. It is usually cheaper to spend relatively small amounts of money on interventions that keep people healthy across the life span than it is to spend relatively large amounts of money helping people recover from serious health problems (FIGURE 1-7). Severe health problems, long-term disabilities, and untimely deaths are expensive for the affected individuals and for their families, who must pay the direct costs of medical care as well as bear the direct and indirect costs of caregiving. Health problems are also costly for the communities and nations that lose the economic and other contributions the affected individuals would have made through work productivity, tax revenue, and service if they had lived longer, healthier lives. **Prevention science** is the process of

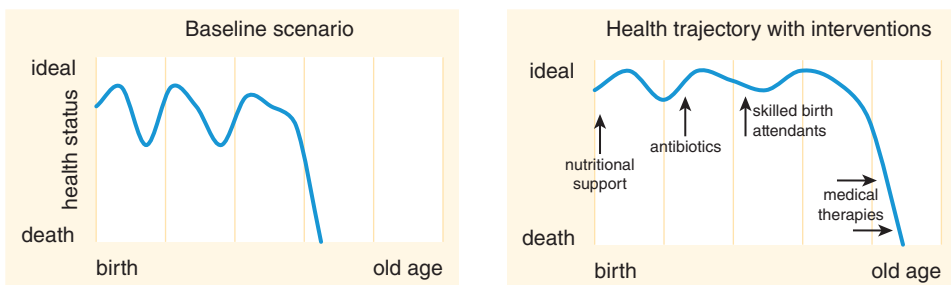


FIGURE 1-6 Examples of interventions that improve health trajectories across the life span.

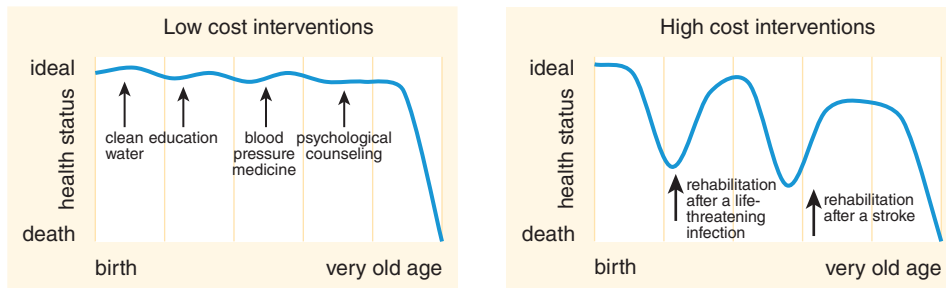


FIGURE 1-7 Maintaining good health status through preventive interventions is less costly than paying for rehabilitation after health crises.

determining which preventive health interventions are effective in various populations, how successful the interventions are, and how well they can be scaled up for widespread implementation.¹⁴

There are three levels of prevention (FIGURE 1-8). When an effective intervention for preventing disease or promoting health has been identified, **primary prevention** actions can keep an adverse health event from ever occurring. Numerous global health initiatives focus on primary prevention. Some promote health behaviors, such as vaccinating children to protect them from measles and polio infections, exercising to protect against heart disease, avoiding tobacco to reduce the risk of lung disease, and using a seatbelt to reduce the risk of serious injuries during a motor vehicle collision. Some programs work to modify the health environment by increasing access to improved sanitation facilities to prevent diarrhea, spraying insecticides to kill the mosquitoes that spread infections, implementing clean delivery room practices to prevent infections of newborns and their mothers, and building roads that are safe for bicyclists and pedestrians. Others use policy changes to improve access to healthcare services, essential medications, and nutritious foods.

The goal of **secondary prevention** is to detect health problems at an early stage when they have not yet caused significant damage to the body and can be treated more easily.

Secondary prevention interventions typically are targeted at people with early, asymptomatic (that is, not symptomatic) disease, so that health problems can be diagnosed before they become so severe that the affected individuals seek health services. There are numerous types of cancer screening tests that are forms of secondary prevention, such as mammography for breast cancer, Pap smears for cervical cancer, and colonoscopies that look for the polyps that are precursors to colorectal cancer. Other examples of screening tests include routine HIV tests, blood pressure checks in adults, and vision tests for children, all of which are intended to detect health issues in people who might otherwise remain unaware of the presence of these manageable health conditions for many years.

The aim of **tertiary prevention** is to reduce impairment, minimize pain and suffering, and prevent death in people with symptomatic health problems. Examples of tertiary prevention include treating chronic diseases with medication, alleviating the pain of people with advanced cancers, and providing physical therapy and occupational therapy to people recovering from strokes.

Given the three levels of prevention, there is almost always some intervention that could improve the health of those who are vulnerable to a particular disease or are already sick. Primary prevention is the preferred option when a cost-effective preventive intervention is available. When primary prevention is not

Level	Also Called...	Target Population	Goal	Examples
Primary prevention	Prevention	People without disease	Prevent disease from ever occurring	<ul style="list-style-type: none"> ■ Vaccinating children to protect them from paralytic polio ■ Giving vitamin A capsules to at-risk children to prevent blindness
Secondary prevention	Early diagnosis	People with early, non-symptomatic disease	Reduce the severity of disease and prevent disability and death	<ul style="list-style-type: none"> ■ Checking blood pressure routinely to detect the onset of hypertension ■ Screening with mammography to detect early-stage breast cancer
Tertiary prevention	Treatment and rehabilitation	People with symptomatic disease	Reduce impairment and minimize suffering	<ul style="list-style-type: none"> ■ Extracting teeth with severe decay in order to alleviate pain ■ Providing physical therapy to people who have been injured in a vehicle collision in order to prevent long-term disability

FIGURE 1–8 Three levels of prevention: primary, secondary, and tertiary.

possible or health problems are already present, secondary prevention and tertiary prevention can improve longevity and quality of life.

► 1.4 Health Transitions

The changing health profiles observed in high-income countries over the last century are strong evidence that large-scale health interventions are effective at improving health throughout the life course. One hundred years ago, most populations across the globe had similar health profiles: high birth rates, high death rates, short life expectancies, and a considerable number of diseases and deaths due to infections and undernutrition. During the 20th century, most high-income nations made a transition to a

lower birth rate, a lower death rate, longer life expectancies, and a higher burden from the chronic diseases often associated with overnutrition. For example, in the United States, the leading causes of death in 1800 and 1900 were pneumonia (including pneumonia caused by influenza), tuberculosis, and diarrhea, all of which are infectious diseases.¹⁵ By 1950, the death rate had dropped significantly, life expectancy had increased, and the most common causes of death had shifted to heart disease, cancer, and stroke, the same noncommunicable diseases that remain the most frequent causes of death in the United States today.¹⁶ These changes in population health status were due to a variety of factors, including new health technologies, such as new vaccines, new antibiotics, and new contraceptives, as well as improved sanitation,