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.

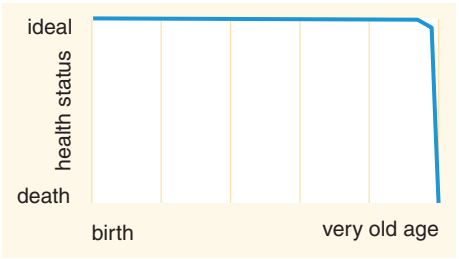
A more comprehensive definition of health addresses both physical and mental health as well as the presence of a social system that facilitates health. The Constitution of the World Health Organization (WHO), written in 1948, defines **health** as "a state of complete physical, mental, and social well-being 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,

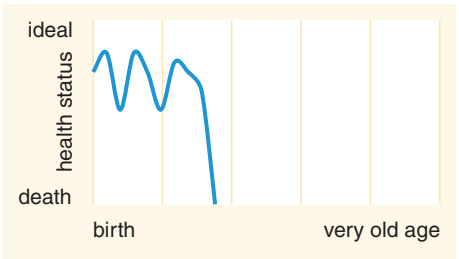
the ideal health trajectory continues with that healthy infant growing into adulthood without experiencing serious infections, injuries, or illnesses, and that adult remaining healthy and active for many decades. Because everyone eventually dies, the ideal health trajectory ends in very old age with 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



A (Ideal Health Trajectory)



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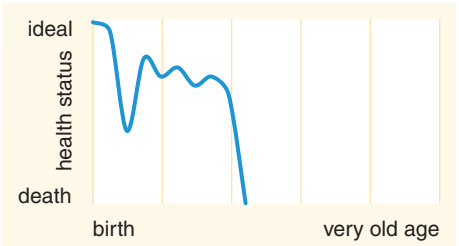

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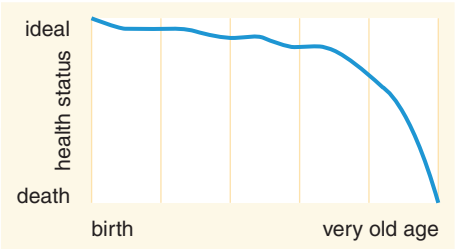

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FIGURE 1–1 Examples of health trajectories.

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	
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

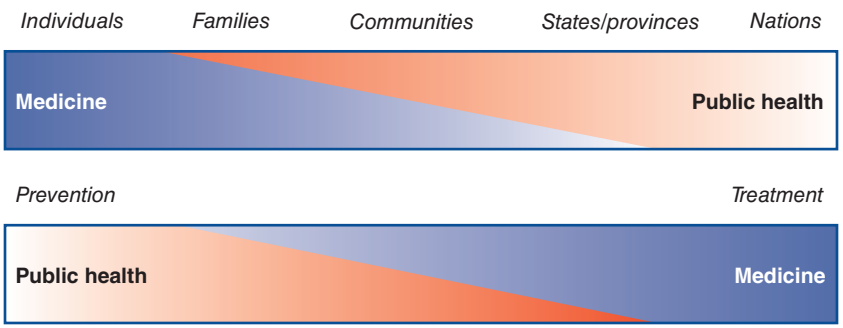

FIGURE 1–5 Comparing medicine and public health.

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

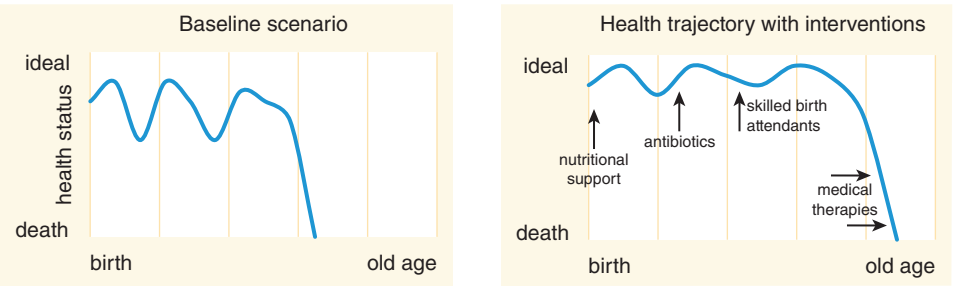

FIGURE 1–6 Examples of interventions that improve health trajectories across the life span.

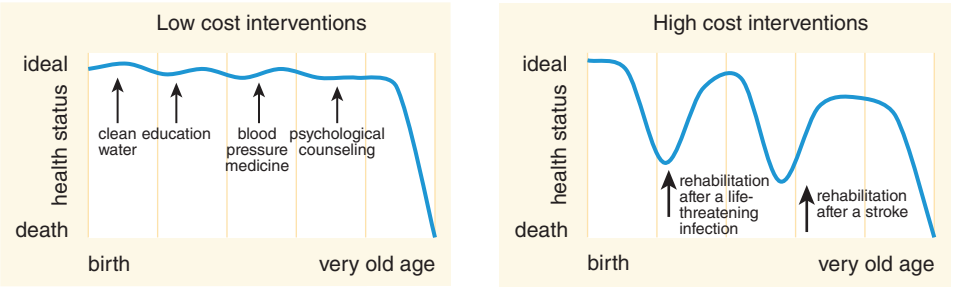

FIGURE 1–7 Maintaining good health status through preventive interventions is less costly than paying for rehabilitation after health crises.

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	■ 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	■ 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	■ 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,

better nutrition, increased education, and economic growth.[17]

A **health transition** is a shift in the health status of a population that usually occurs in conjunction with socioeconomic development. Over the last century, high-income countries have experienced a diversity of health transitions: decreases in fertility rates, changes in population size and age structures, substantial reductions in the risk of death from pregnancy-related conditions, shifts from hunger to obesity as a dominant nutritional concern, increases in health problems associated with sedentary lifestyles, decreases in infectious diseases and corresponding increases in chronic diseases, reductions in infant and child mortality, and increases in life expectancy and the proportion of older adults in the population (**FIGURE 1–9**). Low-income countries have not experienced such dramatic changes.

Because some countries have gone through these health transitions and other countries have not, there are now significant differences in health status in the highest-income and lowest-income countries (**FIGURE 1–10**). A diversity of health statistics

Type of Transition	Pre-transition Populations	Post-transition Populations
Fertility transition	The typical woman gives birth to several children.	The typical woman gives birth to only one child or two children.
Demographic transition	The total population size may be increasing due to high birth rates.	The total population size may be shrinking because birth rates are so low.
Obstetric transition	Pregnancy-related conditions are a common cause of death in women of reproductive age.	The maternal mortality rate is very low.
Nutrition transition	Underweight is a major concern.	Obesity is a major concern.
Risk transition	Environmental exposures like unsafe drinking water and polluted indoor air are major contributors to disease.	Lifestyle factors like physical inactivity and tobacco use are major contributors to disease.
Epidemiologic transition	Infectious diseases in children are a significant burden to the population.	Chronic diseases in adults are the dominant health concern in the population.
Mortality transition	High death rates in children and reproductive-age adults mean that few people live to very old age.	Low mortality rates for children and reproductive-age adults allow many people to live to old age.
Aging transition	Children comprise the majority of the total population.	Older adults are a growing proportion of the population.

FIGURE 1–9 Examples of health transitions.

Today, in Very LOW-Income Populations…	Today, in Very HIGH-Income Populations…
■ There are high rates of poverty, illiteracy, and unemployment, which can have negative effects on personal, family, and community health.	■ Most people have access to the basic tools for health, although there are still health disparities based on socioeconomic status.
■ Many people do not have access to an outhouse or other type of toilet and many do not have reliable access to safe drinking water.	■ Almost everyone has indoor plumbing and safe drinking water.
■ Many infants and young children die from diarrhea, pneumonia, malaria, and other infections.	■ Almost every baby will survive to adulthood.
■ The typical woman gives birth to many children, and it is not uncommon for women to die in childbirth.	■ The typical woman gives birth to 1 or 2 children, and very few women die due to pregnancy-related conditions.
■ The median (average) age of the population is in childhood.	■ The median (average) age of the population is in adulthood.
■ A typical age at death for adults is 60 or 70 years old.	■ A typical age at death for adults is 80 or even 90 years old.
■ Visits to hospitals and clinics are usually because of infections (such as malaria or tuberculosis) or serious injuries.	■ Visits to hospitals and clinics are usually due to chronic noncommunicable diseases (such as arthritis, back pain, hypertension, and diabetes).
■ Access to effective management of chronic diseases (such as hypertension and diabetes) is very limited.	■ Screening tests (such as mammography for breast cancer) often detect emerging health problems early, when they are usually more treatable.
■ Undernutrition (including protein energy and micronutrient deficiencies) remains a significant public health concern.	■ Overweight and obesity are major public health concerns, and many people have diets that are excessively high in fat and calories.
■ Very few people with mental health disorders receive clinical care because there are so few psychiatrists and psychologists.	■ Clinical mental health services are usually available, but they are often underused.
■ Serious injuries often lead to death because no surgical services are available.	■ Serious injuries can often be treated with surgery and rehabilitation

FIGURE 1–10 Examples of significant differences in health status and access to the tools for health in low-income and high-income countries.

illustrate the wide gaps in health status.[18] A baby born in Japan in 2015 could expect to live to about 84 years old, but a newborn in Sierra Leone, in West Africa, could only expect to live to age 50. A woman giving birth in Sierra Leone in 2015 was about 450 times more likely to die of a pregnancy-related condition than a pregnant woman living in Finland, in northern Europe. A baby born in Angola, in southwestern Africa, was nearly 80 times more likely to die before his or her fifth birthday than a baby born in Iceland. A 30-year-old living in Mongolia, in central Asia, was 3.5 times more likely to die from heart disease, cancer, chronic respiratory diseases, or diabetes before age 70 than an adult of the same age living in Switzerland. Those multipliers would not have been as high 100 years ago when no one had access to neonatal intensive care units, advanced obstetric care, antibiotics, and medications for managing chronic diseases. As some populations have gained access to more tools for health, and others have not, the disparities in the health profiles of high- and low-income countries have become more extreme.

Middle-income countries tend to have intermediate health profiles with statistics somewhere between those of high-income and low-income countries. Many middle-income countries continue to have some populations burdened by undernutrition and infectious diseases while, at the same time, other populations within the same country experience the challenges associated with obesity and chronic noncommunicable conditions. This need for the health system in middle-income countries to address both "pre-transition" and "post-transition" health problems is sometimes called the "dual burden" of disease. Comparing high-, middle-, and low-income countries provides insights into how health transitions occur and insights into the types of interventions that are likely to be effective at achieving particular types of changes in population health status.

1.5 World Regions and Featured Countries

Throughout this book, data from eight large countries will be used to represent the diversity of the world's health profiles, including the three countries with the largest populations—China and India, which each have more than 1 billion residents, and the United States, which has more than 320 million inhabitants—as well as five other countries that are among the 19 countries that are each home to more than 1% of the world's population (that is, more than 75 million people).[19] Together, these eight countries are home to half of the world's people (**FIGURE 1–11**).

The featured countries represent a diversity of economic profiles (**FIGURE 1–12**). The World Bank divides countries into four categories based on the gross national income per person. Of the eight featured countries, two are classified as high income, three as upper-middle income, two as lower-middle income, and one as low income. This classification is

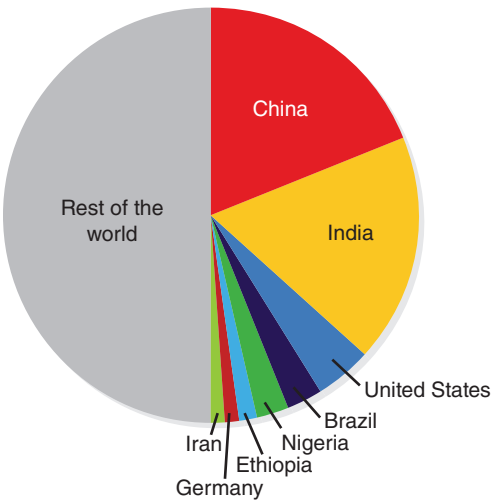

FIGURE 1–11 The eight featured countries represent nearly half of the world's population.

Data from *World development indicators 2016*. Washington DC: World Bank; 2016.

Country	World Bank Income Group	UNDP Human Development Level
United States	High	Very high
Germany	High	Very high
Iran	Upper middle	High
Brazil	Upper middle	High
China	Upper middle	High
India	Lower middle	Medium
Nigeria	Lower middle	Low
Ethiopia	Low	Low

FIGURE 1–12 Eight featured countries by income group.

The countries are listed in order from highest to lowest human development index.

Data from *World development indicators* 2016. Washington DC: World Bank; 2016. *Human development report 2016*. New York: UNDP; 2016.

similar to the distribution of the world's population by income level, since 70% of the world's people live in a country classified as middle income by the World Bank (**FIGURE 1–13**).[19] Many analyses of global health compare the health status in **low- and middle-income countries (LMICs)**, a category that includes all low-income, lower-middle-income, and upper-middle-income countries, to the health status in high-income countries (HICs). Some global health reports compare LMICs to countries that are members of the **Organisation for Economic Co-operation and Development (OECD)**, an intergovernmental organization that represents about three dozen of the world's richest countries. Six of the eight featured countries in this book are LMICs and two are OECD-member HICs.

The United Nations Development Programme (UNDP) divides countries into four groups (very high, high, medium, and low) based on a human development index calculated from income per person plus statistics about longevity and education.[20] These categories generally align with the World Bank group classifications, but one of the featured lower-middle-income countries (Nigeria) is classified as having a low rather than a medium human development level. The featured countries also represent geographic diversity (**FIGURE 1–14**), covering all seven World Bank analytical regions and all six of the WHO's regions (**FIGURE 1–15**).

There is often considerable diversity in the socioeconomic and health profiles of countries within the same world region. There is also considerable diversity among different states or provinces within countries and between urban and rural areas. These types of within-country differences can be observed in all eight of the featured countries. For example, parts of southern Nigeria have a middle-income economic profile while some of the northern areas of Nigeria have a very low-income profile and are at risk of famine.[21] National statistical reports present the average values for various metrics, and those averages do not

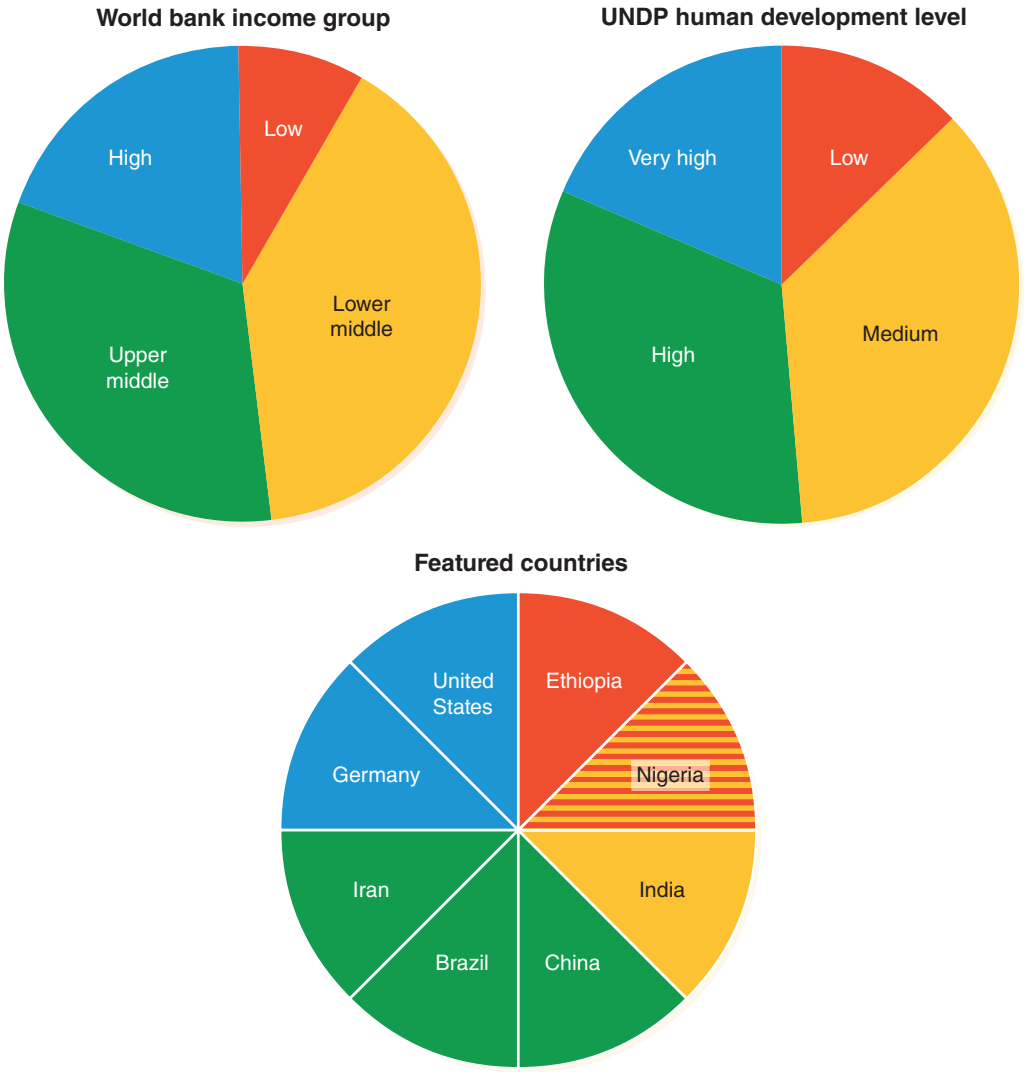

FIGURE 1–13 Most of the world's people live in a country classified as middle income by the World Bank.
Data from *World development indicators 2016*. Washington DC: World Bank; 2016; *Human development report 2016*. New York: UNDP; 2016.

express the wide range of values that may be present within diverse regions of the country. Despite that limitation, general patterns can be observed by comparing statistics from large countries. The differences between higher-income (high- and upper-middle-income) countries and lower-income (lower-middle and low-income) countries are often notable (**FIGURE 1–16**). For example, data from just the eight featured countries are sufficient to illustrate the patterns associated with the fertility transition (women in higher-income countries have fewer babies), the obstetric transition (higher-income countries have lower rates of maternal mortality), and the aging transition (higher-income countries have older populations) (**FIGURE 1–17**).[20] Similar trends can be observed for a great diversity of indicators.

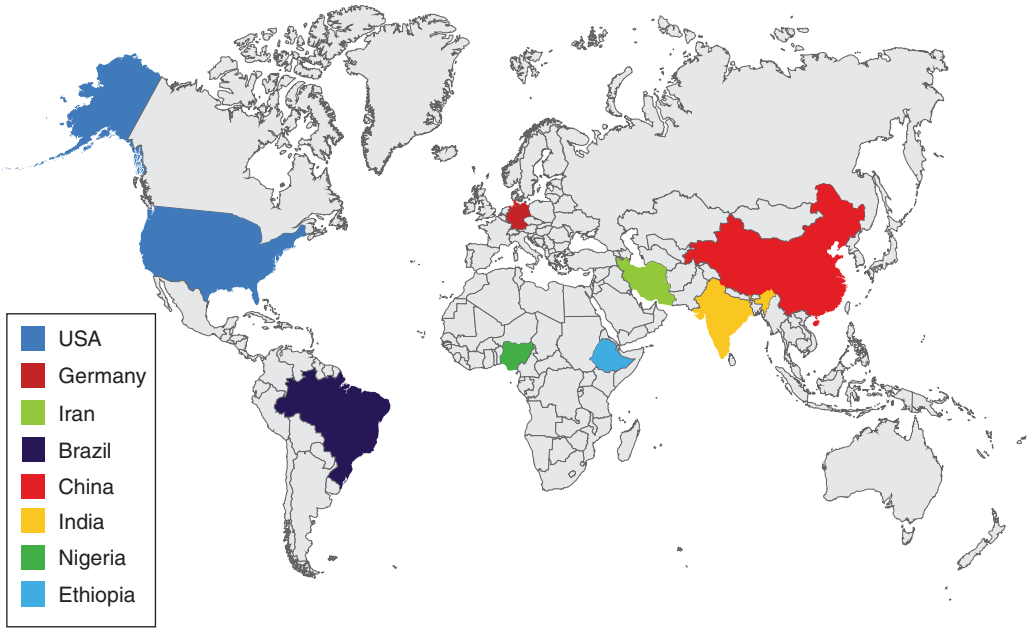

FIGURE 1–14 Eight featured countries representing nearly half of the world's population.

Data from *World development indicators 2016*. Washington DC: World Bank; 2016.

Country	Geographic Location	World Bank Region	WHO Region
United States	North America	North America	Americas
Germany	Europe	Europe and Central Asia	Europe
Iran	Middle East	Middle East and North Africa	Eastern Mediterranean
Brazil	South America	Latin America and the Caribbean	Americas
China	East Asia	East Asia and Pacific	Western Pacific
India	South Asia	South Asia	South-East Asia
Nigeria	West Africa	Sub-Saharan Africa	Africa
Ethiopia	East Africa	Sub-Saharan Africa	Africa

FIGURE 1–15 Eight featured countries by geographic location.

World development indicators 2016. Washington DC: World Bank; 2016; *World health statistics 2016: Monitoring health for the SDGs*. Geneva: WHO; 2016.

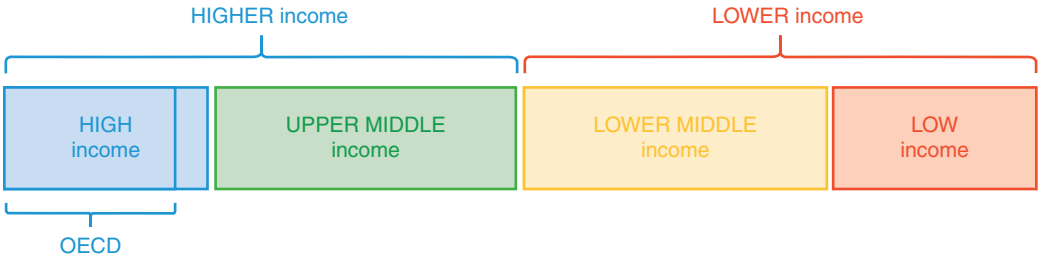

FIGURE 1–16 Income-level terminology.

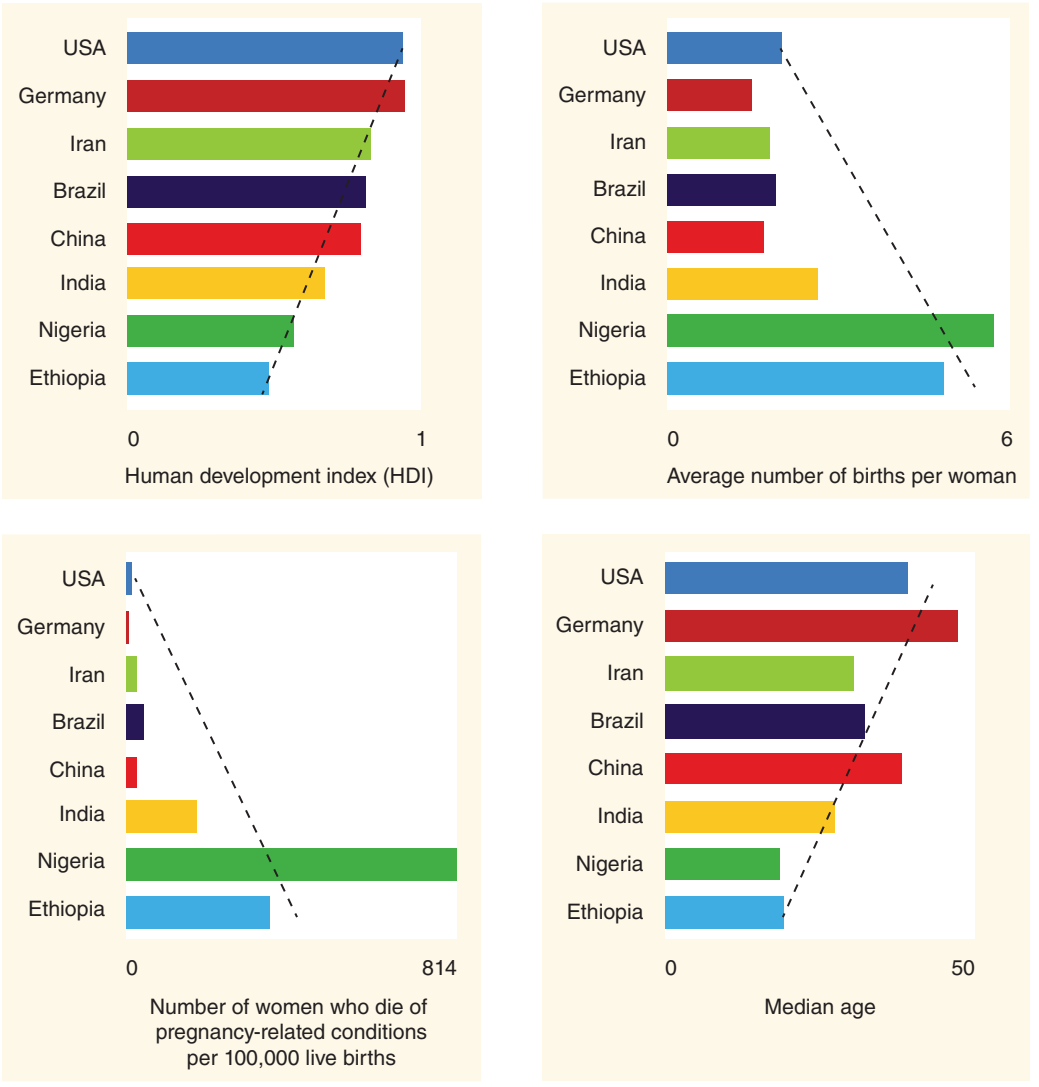

FIGURE 1–17 Examples of socioeconomic and health trends.

Data from *Human development report 2016*. New York: UNDP; 2016.

1.6 Global Health Security

The goal of the first international health initiatives was to prevent widespread outbreaks of infectious diseases. For example, a series of International Sanitary Conferences held in various European cities starting in 1851 assembled representatives from several countries to address concerns about travel and trade spreading cholera to new ports.[22] Signatories of the resulting agreements agreed to notify other countries about outbreaks of cholera, plague, yellow fever, and other epidemic diseases, and they pledged to monitor health at ports and impose quarantines on disease-carrying ships.[23] These treaties set the stage for the International Sanitary Regulations (later renamed the International Health Regulations) that were approved by the WHO 100 years later in 1951 and are still in force today. By the early 1900s, international regulations addressed several other cross-border health issues, including drugs and alcohol sales, occupational health and safety, and water pollution,[24] but the initial impetus for these deliberations was the recognition that countries had to collaborate with their neighbors to keep dangerous pathogens at bay.

A second set of early international health concerns focused on threats to economic and political interests. The field of tropical medicine blossomed in the late 1800s and early 1900s as more European (and American) military personnel, businessmen, and their families relocated to colonies in tropical climates.[25] Tropical medicine specialists aimed not only to protect settlers from parasitic and infectious diseases—a role similar to that of travel medicine specialists today—but also to ensure that the workforce in these areas could be productive.[26] Today, tropical medicine has expanded to become **international health**,[10] a term that now typically refers to initiatives targeted toward addressing poverty-related health conditions in lower-income areas, no matter which geographic region they happen to be located in.[27] While many international health programs are humanitarian, they also enable workers and consumers in the recipient countries to remain active participants in the global economy.

Human security was defined in the 1994 *Human Development Report* as the freedom from fear and want that results from having health security as well as food security (freedom from hunger), personal security (freedom from violence), environmental security (freedom from preventable environmental vulnerabilities), economic security (freedom from extreme poverty), community security (freedom from discrimination), and political security (freedom from human rights violations).[28] Human security focuses on individual and community well-being, while national security focuses on the protection of the collective interests of people living within a country's borders. For many countries, promoting health security and other aspects of human security in other countries is a core component of national security plans.[29] The investment in global health activities by high-income countries generates major returns through expanded markets for international trade, strengthened diplomatic relationships, and fortified homeland security.[30]

The nascent field of **global health security** seeks to protect populations from threats to health and safety by engaging a diversity of stakeholders, including governmental and military personnel, in public health interventions.[31] The current concept of global health security is an extension of the historic international health policies and practices that aimed to stem the spread of epidemics as international travel and trade became more common.[32] Communities and countries suffering from widespread health problems are more likely to have political and economic instability, and poverty and unrest can further exacerbate public health problems that might spill over into other parts of the world. International and global health

initiatives can help to break this cycle, facilitating peace and productivity. Global health security recognizes that countries participating in global health activities reap the benefits of self-protection in addition to the humanitarian gains and goodwill that these actions may generate.[33]

1.7 Globalization and Health: Shared Futures

Globalization is the process of countries around the world becoming more integrated and interdependent across economic, political, cultural, and other domains. Globalization contributes to the health transitions that are occurring in many parts of the world by increasing access to health technologies, encouraging urbanization, changing social and cultural practices, and accelerating environmental changes.[34] Globalization can also be observed in the increasing number of global governmental and nongovernmental organizations, the proliferation of multilateral trade agreements, and increases in global supply chains, foreign direct investment, population mobility, communication, data sharing, and cultural diffusion.

The concept of globalization is not new to the field of public health. Infectious diseases like plague and smallpox spread across Asia and Europe more than a 1000 years ago, when sea and land trade routes like the Silk Road linked China, India, and the Mediterranean. The pathogens carried by the Europeans who explored the Americas in the 15th century caused the decimation of many indigenous American populations, while some infections indigenous to the Western hemisphere (such as syphilis) made their way back to Europe and sparked mass epidemics.[35] Pathogens have never stopped at national boundaries, and modern transportation allows for a new infectious disease that emerges in any part of the world to be transported by aircraft to any other part of the world within hours rather than weeks or months. Concerns about globalization and health also encompass a diversity of other emerging health issues, like bioterrorism, drug resistance, food safety, and the health effects of climate change.

Globalization is not a uniformly good or bad process, but one that yields a mix of positive and negative outcomes.[36] For example, globalization has allowed more goods to be manufactured in middle-income countries and then sold in high-income countries where higher salaries for workers make manufacturing comparatively expensive. In middle-income countries, globalization often means more job opportunities, but there may also be pressures to increase productivity even if that causes environmental damage or creates unsafe working conditions. In high-income areas, international trade reduces the cost of consumer products but it also means that there are fewer local jobs in the manufacturing sector. Cheaper products created in middle-income countries also make it harder for the lowest-income countries to participate in the global economy because the poorest countries do not have educational systems geared toward producing a technologically skilled workforce. Globalization tends to create greater inequalities in income between countries and within countries.

Concerns about the adverse impacts of globalization have led in many countries to the rise of nationalistic political movements that call for greater self-reliance and less engagement with other nations. However, even if countries implement isolationist policies, it is not possible to eliminate the need for involvement in global health activities. The threat from emerging infectious diseases is an ancient one that will continue to exist for future generations, and environmental hazards can easily cross international borders when they are carried by air, water, or animals. Whether a country has pro- or anti-globalization policies, it is in every country's best interests to actively engage in

communicating about transnational health concerns, sharing the scientific discoveries that enable populations to fortify themselves against threats to health, and collaborating on health interventions that promote peace, prosperity, and security.

Global health offers a proactive way to prevent outbreaks (and to respond to them when they happen), to protect economic and political interests at home and abroad, to promote goodwill and humanitarian values, and to achieve shared health and development goals.[37] Global health is a dynamic field. The health patterns that exist today are not the same as the patterns from 100 years ago, and new health transitions will occur in the coming decades. Global health provides an opportunity to use prevention strategies and other interventions to shape a healthier, safer future for the world's people.

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