PART I

Principles, Measurements, and the Health–Development Link

CHAPTER 1

The Principles and Goals of Global Health

Learning Objectives

By the end of this chapter the reader will be able to:

- Define the terms *health*, *public health*, and *global health*
- Discuss some examples of public health efforts
- Discuss some examples of global health activities
- Describe some of the guiding principles of public health work
- Describe the Millennium Development Goals and their relation to global health
- Briefly discuss the global effort to eradicate smallpox

VIGNETTES

By 2005, polio was on the verge of being eradicated. That year, however, rumors circulated in northern Nigeria that the polio vaccine was causing sterility. In response to these rumors, some community leaders discouraged people from immunizing their children. Within months, polio cases began to appear in the area. Shortly thereafter, polio cases spread from northern Nigeria to Sudan, Yemen, and Indonesia. The global campaign to eradicate polio had been dealt a major blow, stemming partly from rumors in one country about the alleged side effects of the vaccine.[1]

Getachew is a 20-year-old Ethiopian with HIV. His disease is advanced, but he receives no treatment for it. He has tuberculosis (TB) and much of his mouth is coated with a white, pasty yeast called thrush. He has lost more than 20 percent of his body weight. He stopped going to work some time ago, has no money, and is totally dependent on his family for care and day-to-day needs. Getachew is one of about 760,000 people in Ethiopia with HIV.[2] In fact, in 2013 about 35 million people were living with HIV worldwide.[3] There are countries in Africa, such as Botswana, Lesotho, and Swaziland, in which about one quarter of the adults are HIV-positive.[3]

Laurie lived in Portsmouth, Virginia, in the United States. She was 50 years old and had always been healthy. Last weekend, she woke up with a headache, a high fever, and a very stiff neck. Laurie was so sick that she went to the emergency room of the local hospital. The physicians diagnosed Laurie as having meningitis, an inflammation of the membrane around the brain and spinal cord,[4] that was caused by the West Nile virus. This virus originated in Egypt in the 1930s and is transmitted by a mosquito. Today, the virus can be found in much of the world.[5]

Jim Smith is a high school student in London, England. Early in the school year, he had a fever and cough that would not go away. He did not feel like eating. He slept badly and woke up every morning in a sweat. Jim had TB. Although many people think that TB has been eliminated from high-income countries, it has not. Rather, the spread of HIV has triggered an increase in TB worldwide. In addition, immigration is helping to spread the disease from lower-income to higher-income countries. In fact, there are urban areas of the United Kingdom in which the rates of TB are higher than the rates in some low- and middle-income countries.[6]

Nirupama is a 50-year-old woman who lives in Chennai, India. "Niru," as her friends call her, has diabetes. She is dependent on a regular supply of insulin, which she picks up monthly at a government clinic. Although she is only 50, she already has suffered some of the circulatory complications of diabetes. There is a common perception that diabetes is a disease that affects only people in high-income countries. This,

however, is not the case. Rather, the prevalence of diabetes is growing rapidly in low- and middle-income countries. India now has the largest number of people with diabetes.[7] The highest percentage of an adult population with the disease can be found in the Pacific Island of Nauru, in which 31 percent of adults have diabetes.[7]

WHY STUDY GLOBAL HEALTH

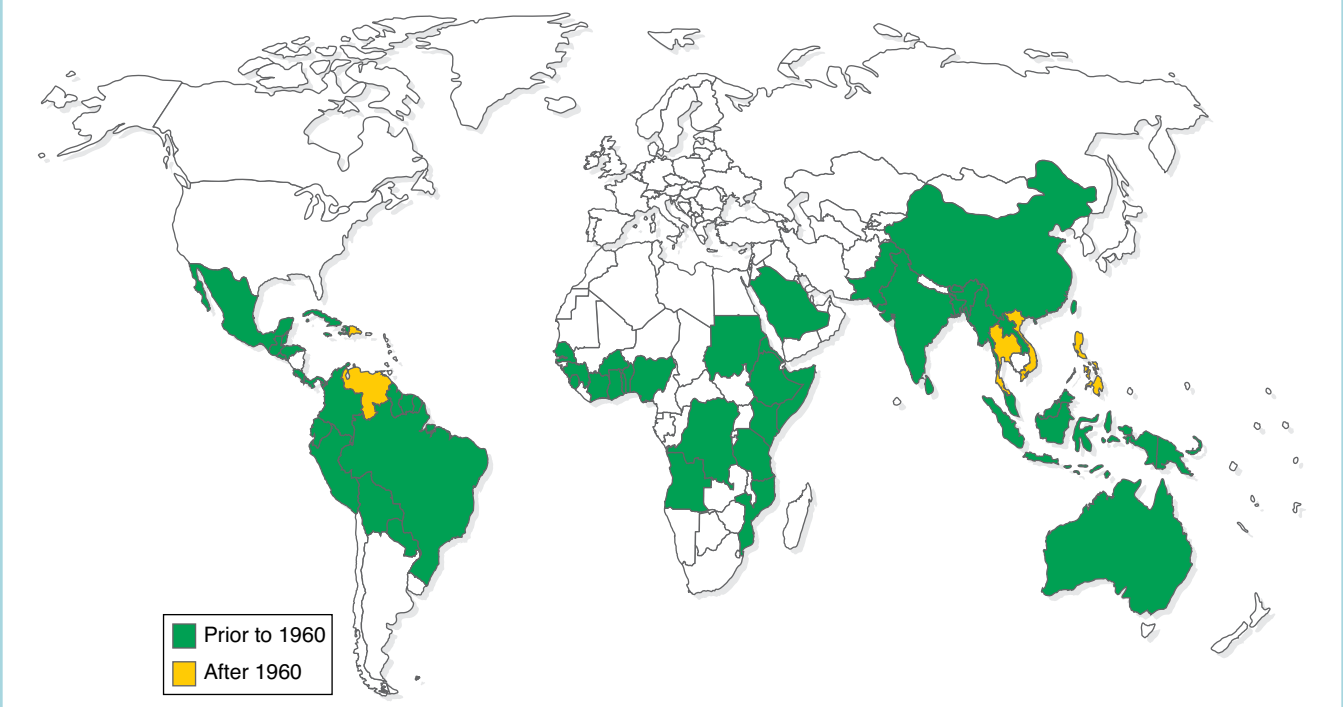
Over the last 50 years, the world has made significant progress in improving human health. From 1950 to 2012, for example, the death rate of children under 5 years fell from 148 deaths per 1,000 children to fewer than 48 deaths per 1,000 children.[8,9] From 1950 to 2010, life expectancy for the world grew from 48 years to 68 years.[9,10] Smallpox has been eradicated, polio has been eliminated in all but a few countries, and great progress has been made in reducing the burden of vaccine-preventable diseases in children and the burden of parasitic infections, such as Guinea worm. One reason to study global health is to gain a better understanding of the progress made so far in addressing global health problems.

Another reason to study global health, however, is to better understand the most important global health challenges that remain and what must be done to address them rapidly, effectively, and efficiently. Despite the important progress in improving human health:

- 289,000 women are estimated to have died of maternal causes in 2013.[11]
- 6.3 million children under 5 years of age died in 2013.[12]
- 1.5 million people died of TB in 2013.[13]
- 1.5 million people died of HIV-related causes in 2013.[14]
- 584,000 people died of malaria in 2013.[15]

In addition, the world is shrinking and the health of people everywhere must be of concern to all of us. This is particularly important because many diseases are not limited by national boundaries. Tuberculosis, HIV, and polio, for example, can spread from one country to the next. Prior to 1960, dengue fever used to be concentrated largely in Southeast Asia and the coast of South America. However, cases are now seen in five continents, as shown in **Figure 1-1**.[16,17]

FIGURE 1-1 The Spread of Dengue Fever/Dengue Hemorrhagic Fever



Reproduced from WHO, Impact of dengue: Emergence of DEN/DHF. Retrieved October 31, 2014, from http://www.who.int/csr/disease/dengue/impact/en.

The "avian flu" first appeared in East Asia, but it, too, is spreading to other regions. Ten years ago, no one in Laurie's neighborhood ever thought of getting West Nile virus. Recently, the chikungunya virus has also been spreading globally.

Besides the central global health challenges noted previously, there are also exceptional disparities in the health of some groups compared to the health of others. Life expectancy in Japan and France, for example, is about 83 years, but it is only 45 years in Sierra Leone.[18] In addition, there are a number of life-saving technologies, such as the hepatitis B vaccine, that have been used in high-income countries for many years that are not yet used as widely in low-income countries. In fact, the previous points raise important ethical and humanitarian questions about the extent to which people everywhere should be concerned about disparities in access to health services and in health status.

The important link between health and development is another reason to pay particular attention to global health. Poor health of mothers is linked to poor health of babies and the failure of children to reach their full mental and physical potential. In addition, ill health of children can delay their entry into school and can affect their attendance, their academic performance, and, therefore, their future economic prospects. Countries with major health problems, such as high rates of malaria or HIV, have difficulty attracting the investments needed to develop their economies. Moreover, having large numbers of undernourished, unhealthy, and ill-educated people in any country is destabilizing and poses a health, economic, and security threat to all countries.

The nature of many global health concerns and the need for different actors to work together to address them are more reasons why we should be concerned with global health. Although locally relevant solutions are needed to address most health problems, some health issues can be solved only with a global approach. In addition, some problems, such as ensuring access to drugs to treat HIV/AIDS, may require more financial resources than any individual country can provide. Still other global health issues require technical cooperation across countries because few countries have the technical capacity to deal with them. Global cooperation might be needed, for example, to establish standards for drug safety, to set protocols for the treatment of certain health problems, such as malaria, or to develop an HIV vaccine that could serve the needs of low-income countries.

The concepts and concerns of global health are also becoming increasingly prominent worldwide. The spread of HIV, the SARS scare, the fear of the avian flu, and a new outbreak of Ebola virus in West Africa have all brought attention to global health. The advocacy efforts, for example, of Doctors Without Borders and the rock star Bono, the establishment of the Millennium Development Goals, and the philanthropy of the Bill & Melinda Gates Foundation have also dramatically raised attention to global health. The topic has become so important that there is a push in many universities throughout the world to ensure that all students have a basic understanding of key global health issues.

HEALTH, PUBLIC HEALTH, AND GLOBAL HEALTH

Health

Before starting our review of global health in greater detail, it will be helpful to establish a set of definitions for *health*, *public health*, and *global health*. Most of us think of "health" from our individual perspective as "not being sick." The World Health Organization, however, set out a broader definition of health in 1948 that is still widely used:

> Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.[19]

This is the definition of "health" used in this text.

Public Health

Although the World Health Organization (WHO) concept of "health" refers first to individuals, this book is mostly about "public health" and the health of populations. C.E.A. Winslow, considered to be the founder of modern public health in the United States, formulated a definition of public health in 1923 that is still commonly used today. In his definition, public health is:

> the science and the art of preventing disease, prolonging life, and promoting physical health and mental health and efficiency through organized community efforts toward a sanitary environment; the control of community infections; the education of the individual in principles of personal hygiene; the organization of medical and nursing service for the early diagnosis and treatment of disease; and the development of the social machinery to ensure to every individual in the community a standard of living adequate for the maintenance of health.[20]

According to Winslow's definition, some examples of public health activities would include the development of a campaign to promote child immunization in a particular country, an effort to get people in a city to use seat belts when they drive, and actions to get people in a specific setting to eat

healthier foods and to stop smoking. In addition, most levels of government also carry out certain public health functions. These include the management of public health clinics, the operation of public health laboratories, and the maintenance of disease surveillance systems. Other examples are shown in **Table 1-1**.

There are a number of guiding principles to the practice of public health that have been articulated, for example, by the American Public Health Association in its public health code of ethics.[21] These principles focus on prevention of disease, respect for the rights of individuals, and a commitment to developing public health efforts in conjunction with communities. They also highlight the need to pay particular attention to disenfranchised people and communities and the importance of evidence-based public health interventions. In addition, they note the importance of taking account of a wide range of disciplines and appreciation for the values, beliefs, and cultures of diverse groups. Finally, they put considerable emphasis on engaging in public health practice in a way that "enhances the physical and social environment" and that builds on collaborations across public health actors.[21]

Many people confuse "public health" and "medicine," although they have quite different approaches. **Table 1-2** outlines these differences.[22] To a large extent, the biggest difference between the medical approach and the public health approach is the focus in public health on the health of populations rather than on the health of individuals. Exaggerating somewhat for effect, we could say, for example, that a physician cares for an individual patient whom he or she immunizes against a particular disease, whereas a public health specialist is likely to focus on how one ensures that the whole community gets vaccinated. A physician will counsel an individual patient on the need to exercise and avoid obesity; a public health specialist will work with a program meant to help a community stay sufficiently active to avoid obesity. In addition, there are branches of public health, such as epidemiology, that focus on studying patterns and causes of disease in specific populations and the application of this information to controlling health problems.[23] Finally, we should note the exceptional attention that public health approaches pay to prevention of health problems.

TABLE 1-1 Selected Examples of Public Health Activities

- The promotion of handwashing
- The promotion of bicycle and motorcycle helmets
- The promotion of knowledge about HIV/AIDS
- Large-scale screening for diabetes and hypertension
- Large-scale screening of the eyesight of schoolchildren
- Mass dosing of children against worms
- The operation of a supplementary feeding program for poorly nourished young children

TABLE 1-2 Approaches of Public Health and Medicine

Differentiating Factors	Public Health	Medicine
Focus	Population	Individual
Ethical basis	Public service	Personal service
Emphasis	Disease prevention and health promotion for communities	Disease diagnosis, treatment, and care for individuals
Interventions	Broad spectrum that may target the environment, human behavior, lifestyle, and medical care	Emphasis on medical care

Modified with permission from Harvard School of Public Health. About HSPH: Distinctions Between Public Health and Medicine. Retrieved September 8, 2013, from http://www.hsph.harvard.edu/about/public-health-medicine/.

Global Health

What exactly is *global health*? The U.S. Institute of Medicine defined global health as "health problems, issues, and concerns that transcend national boundaries and may best be addressed by cooperative actions."[24]

Another group defined what we would now call global health as "the application of the principles of public health to health problems and challenges that transcend national boundaries and to the complex array of global and local forces that affect them."[25]

The discussion of the definition of global health has continued. Two groups of distinguished public health scholars and practitioners offered additional commentaries on this matter. One group suggested that we should define global health as:

> an area for study, research, and practice that places a priority on improving health and achieving equity in health for all people worldwide. Global health emphasizes transnational health issues, determinants, and solutions, involves many disciplines within and beyond the health sciences, and promotes interdisciplinary collaboration; and is a synthesis of population based prevention with individual-level clinical care.[26]

In response to this suggestion, however, another panel suggested that one should not distinguish between global health and public health more broadly. They also suggested that the key principles of both are the same: a focus on the public good, belief in a global perspective, a scientific and interdisciplinary approach, the need for multilevel approaches to interventions, and the need for comprehensive frameworks for health policies and financing.[27]

The study and practice of global health today reflects many of the comments made here. *Global health* implies a global perspective on public health problems. It suggests issues that people face in common, such as the impact of a growing and aging worldwide population on health or the potential risks of climate change to health. The topic also relates in important ways to problems that require cooperative action. An important part of global health also covers the growing problem everywhere of noncommunicable diseases, as well as the "unfinished agenda" of the health needs of the poor in poor countries. In practical terms, as a new student to global health, it may be best not to worry much about the definition of *global health*, but rather to see the topic as an important part of public health, which itself has many areas of critical importance.

TABLE 1-3 Selected Examples of Global Health Issues

- Emerging and reemerging infectious diseases
- Antimicrobial resistance
- Eradication of polio
- TB
- Malaria
- HIV
- The increasing cases of diabetes and heart disease globally

Some examples of important global health concerns include the factors that contribute to women dying of pregnancy-related causes in so many countries; the exceptional amount of malnutrition among young children, especially in South Asia and Africa; and the burden of different communicable and noncommunicable diseases worldwide and what can be done to control those diseases. The impact of the environment on health globally and the effects of natural disasters and conflicts are also important to global health. Other significant global health issues include how countries can organize and manage their health systems to address the healthiest population possible given the resources available to them, the search for new technologies to address important global health problems, and how different actors can work together to solve health problems that are too significant for any country or actor to solve on their own. Another global health matter of importance is the relationship between globalization and the health of different communities. Some additional global health issues of importance are shown in **Table 1-3**.

CRITICAL GLOBAL HEALTH CONCEPTS

In order to understand and to help address key global health issues like those noted previously, there are a number of concepts concerning global health with which one must be familiar. Some of the most important include:

- The determinants of health
- The measurement of health status
- The importance of culture to health
- The global burden of disease
- The key risk factors for different health conditions
- The demographic and epidemiologic transitions
- The organization and functions of health systems

It is also essential to understand the links among health, education, development, poverty, and equity.

Building on the previous concepts, those interested in global health also need to have an understanding of how key health issues affect different parts of the world and the world as a whole. These include:

- Environmental health
- Nutrition
- Reproductive health
- Child health
- Communicable diseases
- Noncommunicable diseases
- Injuries

Finally, it is important to understand global health issues that are generally addressed through cooperation. Some of these concern conflicts, natural disasters, and humanitarian emergencies. Others relate to the mechanisms by which different actors in global health activities work together to solve global health problems. Harnessing the power of science and technology for global health needs also requires cooperation.

THE ORGANIZATION OF DATA IN THE BOOK

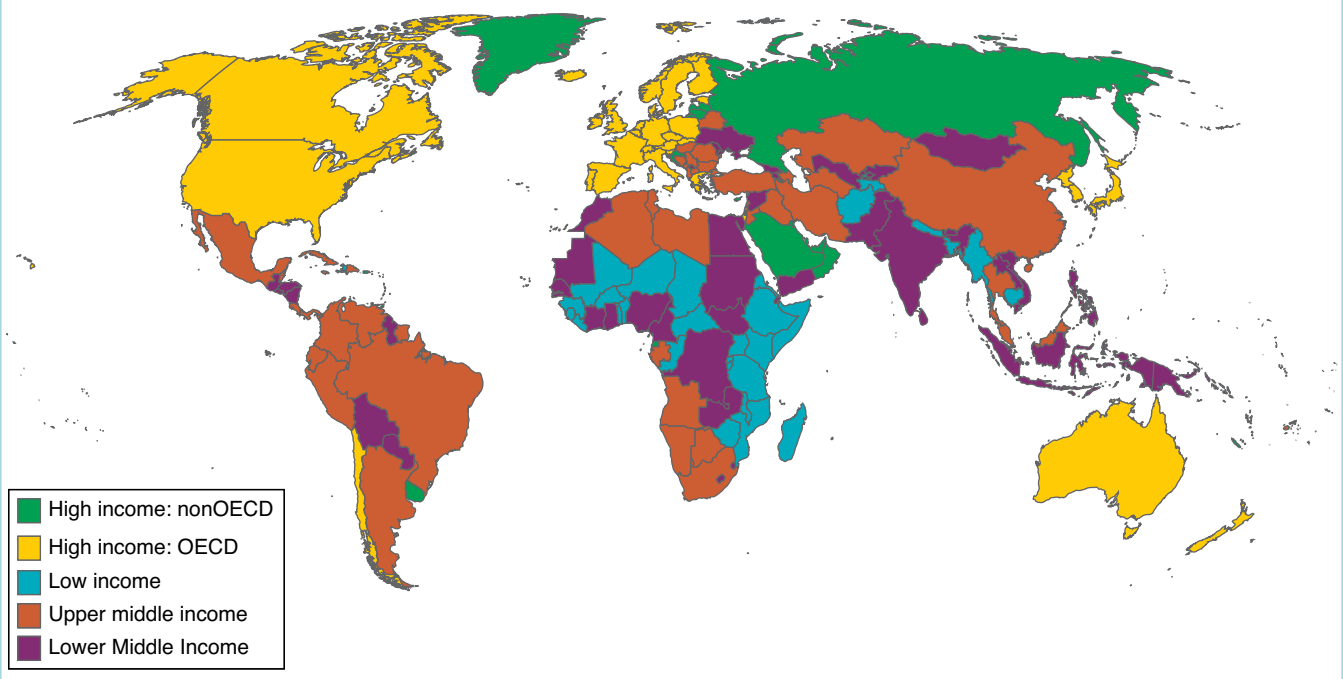
This is a book about global health that has a particular focus on the "health–development link." Thus, data are organized wherever possible by the six World Bank regions:

- Africa
- East Asia and Pacific
- Europe and Central Asia
- Latin America and the Caribbean
- Middle East and North Africa
- South Asia

The Middle East and North Africa region covers essentially the Middle East and the Arabic speaking countries of North Africa. For the sake of clarity and consistent with World Bank data, the Africa region will be referred to as sub-Saharan Africa.

For the most part, the World Bank regions cover only low- and middle-income countries. The World Bank regions are shown in **Figure 1-2**.

FIGURE 1-2 World Bank Region and High-Income Country Groups



Data from The World Bank. Country and lending groups. Retrieved October 31, 2014, from http://data.worldbank.org/about/country-and-lending-groups.

Some critical data, however, are collected only by region of the World Health Organization (WHO). WHO regions cover all countries. Those regions are:

- Africa
- The Americas
- South-East Asia
- Europe
- Eastern Mediterranean
- Western Pacific

Figure 1-3 shows the WHO regions.

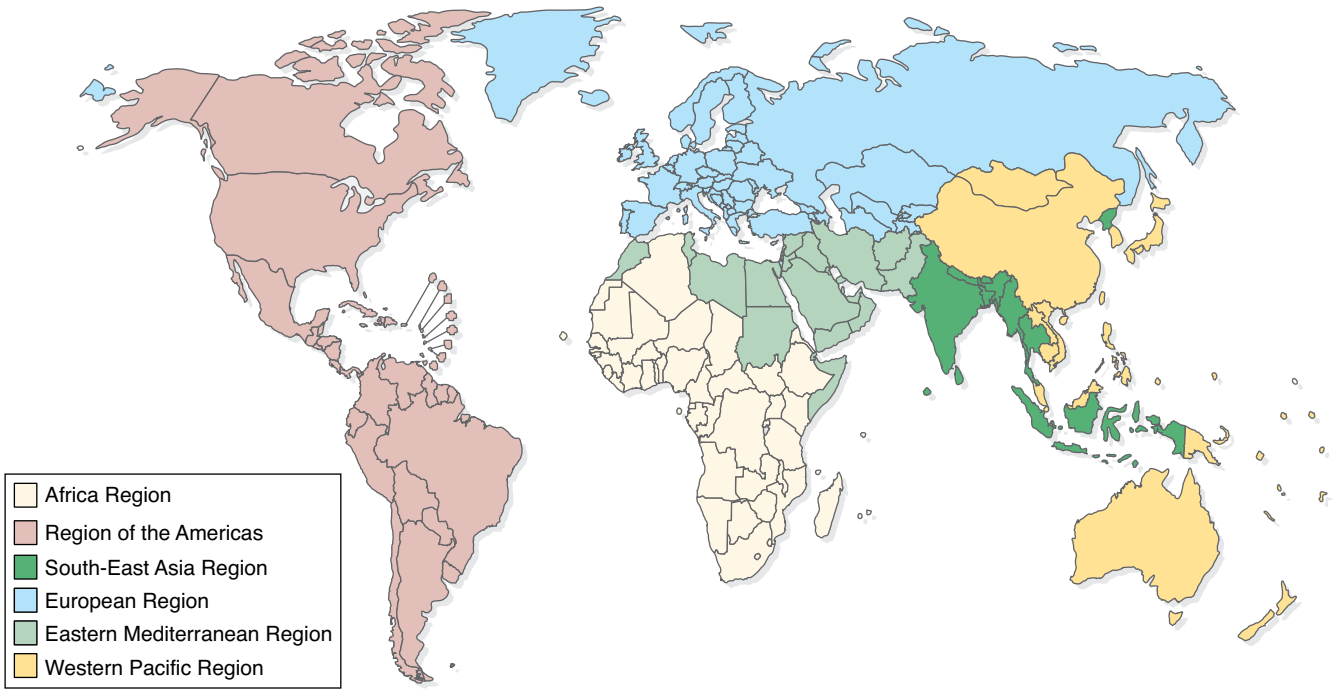
To complement information by World Bank or WHO region, the book also includes information for the high-income countries that are members of the Organization for Cooperation and Development (OECD). The list of countries that belong to the OECD is shown in **Table 1-4**.

The book also speaks of countries in terms of their income and the income group to which they belong. These terms largely follow the definitions used by the World Bank, which divides countries into four income groups, based on their gross national income per person, as shown in **Table 1-5**.[28]

- $1,035 or less—low-income
- $1,036 to $4,085—lower-middle-income
- $4,086 to $12,615—upper-middle-income
- $12,616 or above—high-income

This book contains substantially updated information on the burden of disease and associated risk factors. This information is drawn largely from a study published in 2013 by the Institute of Health Metrics and Evaluations (IHME), *The Global Burden of Disease: Generating Evidence, Guiding Policy*,[29] the extensive website for that study, and a related *Lancet* series on the Global Burden of Disease 2010.[30] The IHME study, *The Global Burden of Disease: Generating Evidence, Guiding Policy*, used 2010 as the base year for its data. It also included a revision of data that was calculated earlier for 1990, to allow for more valid comparisons between 1990

FIGURE 1-3 WHO Regions



Data from WHO. WHO regional offices. Retrieved October 31, 2014, from http://www.who.int/about/regions/en/.

TABLE 1-4 List of OECD Countries

Country	Country	Country
Australia	Hungary	Norway
Austria	Iceland	Poland
Belgium	Ireland	Portugal
Canada	Israel	Slovak Republic
Chile	Italy	Slovenia
Czech Republic	Japan	Spain
Denmark	Korea	Sweden
Estonia	Luxembourg	Switzerland
Finland	Mexico	Turkey
France	Netherlands	United Kingdom
Germany	New Zealand	United states
Greece		

Data from OECD, List of OECD Member Countries—Ratification of the Convention on the OECD, http://www.oecd.org/about/membersandpartners/list-oecd-member-countries.htm. Accessed on November 3, 2014.

TABLE 1-5 World Bank Country Income Groups, 2013, Selected Representative Countries

Low-Income	Lower-Middle-Income	Upper-Middle-Income	High-Income
Bangladesh	Bolivia	Botswana	Belgium
Cambodia	Cameroon	Costa Rica	Canada
Ethiopia	Egypt	Panama	Denmark
Haiti	India	South Africa	Italy
Mozambique	Morocco	Turkey	Netherlands
Zimbabwe	Philippines	Venezuela	Portugal
	Swaziland		Singapore
	Vietnam		Switzerland

Data from the World Bank, Country, and Lending Groups. Retrieved August 5, 2014, from http://data.worldbank.org/about/country-and-lending-groups.

and 2010 about trends in the burden of disease. This text will refer to the study and its parts as *The Global Burden of Disease Study 2010*.

The burden of disease data from the IHME study is complemented as needed by data on particular diseases that is published by other organizations such as UNICEF, WHO, and the World Bank. The data are also complemented when necessary by data from earlier burden of disease studies and from data published in *Disease Control Priorities in Developing Countries*, *Second Edition* and *Third Edition*.[31]

THE MILLENNIUM DEVELOPMENT GOALS

This book makes continuous references to the Millennium Development Goals (MDGs). The MDGs were formulated in 2000 at the United Nations Millennium Summit and were articulated in the Millennium Declaration.[32] There are 8 MDGs and 15 core targets that relate to them. The countries that signed the declaration pledged to meet the MDGs by 2015. The MDGs are important for understanding global health issues because they are an explicit statement of the goals that many countries have set for an important part of their development efforts. The MDGs and their related targets are noted in **Table 1-6**.

All eight of the MDGs relate to health. The goals of reducing child mortality, improving maternal health, and combating HIV/AIDS, malaria, and other diseases directly concern health. However, each of the other goals also relates to health. Hunger and poverty, referred to in goal 1, are intimately linked with health status, both as causes of ill health and as consequences of ill health. The goal of universal primary education can be met only if children are well enough nourished and healthy enough to enroll in school, attend school, and have capacity to learn while they are there. The gender disparities referred to in goal 3 are central to the health issues that affect women globally, many of which relate to their lack of empowerment. Goal 7 is meant to address the need for safe water and sanitation, the lack of which is a major cause of ill health and death. Different actors in global health can work together to help countries improve health status, as indicated in goal 8 on partnerships for development.

The United Nations (UN) has set up a process to develop a new set of global development goals that will build on the MDGs and will be called Sustainable Development Goals. This work is being led by representatives from 70 countries, who share 30 seats on an "Open Working Group," which the UN has established to guide the process.[33,34] It will be important for students of global health to follow the progress in the articulation of the new goals and their relation to health and the determinants of health.

THE CASE STUDIES

Many of the case studies in this book were provided by the Center for Global Development and are elaborated upon further in a companion piece to this book entitled *Case Studies in Global Health: Millions Saved*.[35] That book provides detailed case studies of 20 successful interventions in global health. The cases were carefully selected on the basis of five selection criteria: scale, importance, impact, duration, and cost-effectiveness. When considered together, the cases suggest a number of important lessons that are reflected throughout this book:

- Success in addressing important health problems *is* possible, even in the poorest countries.
- Governments in poor countries *can* manage major public health successes and often can fund them, as well.
- Technology does enable progress in health; however, many successes stem from basic changes in people's behavior, such as filtering water, giving infants oral rehydration for diarrhea, and smoking cessation.
- Cooperation among global health actors can make a major difference to the achievement of health aims.
- It is possible to find evidence of what works and does not work in global health efforts.
- Success comes in all shapes—different types of programs in different types of settings have been and can be successful.

SMALLPOX ERADICATION—THE MOST FAMOUS SUCCESS STORY

It is fitting to end the main part of this introductory chapter with a summary of the most famous public health success story of all, the case of smallpox eradication. This effort was not only a great triumph of public health but also a great accomplishment for mankind. In addition, the history of smallpox eradication is well known to everyone who works in public health, and it provides many lessons that can be applied to other public health efforts.

Background

In 1966, smallpox ravaged over 50 countries, affecting 10 million to 15 million people, of whom almost 2 million died each year.[36] At the time, smallpox killed as many as 30 percent of

TABLE 1-6 The Millennium Development Goals and Their Related Targets

Goal	Targets
Goal 1: Eradicate Extreme Hunger and Poverty	Target 1. Halve, between 1990 and 2015, the proportion of people whose income is less than $1 a day Target 2. Halve, between 1990 and 2015, the proportion of people who suffer from hunger
Goal 2: Achieve Universal Primary Education	Target 3. Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling
Goal 3: Promote Gender Equality and Empower Women	Target 4. Eliminate gender disparity in primary and secondary education, preferably by 2005, and in all levels of education no later than 2015
Goal 4: Reduce Child Mortality	Target 5. Reduce by two-thirds, between 1990 and 2015, the under-5 mortality rate
Goal 5: Improve Maternal Health	Target 6. Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio
Goal 6: Combat HIV/AIDS, Malaria, and Other Diseases	Target 7. Have halted by 2015 and begun to reverse the spread of HIV/AIDS Target 8. Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases
Goal 7: Ensure Environmental Sustainability	Target 9. Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources Target 10. Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation Target 11. Have achieved by 2020 a significant improvement in the lives of at least 100 million slum dwellers
Goal 8: Develop a Global Partnership for Development	Target 12. Develop further an open, rule-based, predictable, nondiscriminatory trading and financial system Target 13. Address the special needs of the least developed countries Target 14. Address the special needs of landlocked developing countries and small island developing states Target 15. Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term

Data from Millennium Project: Goals, Targets, and Indicators. Retrieved April 9, 2011, from http://www.unmillenniumproject.org/goals/gti.htm.

those infected. Those who survived could suffer from deep-pitted scars and blindness as a result of their illness.[37]

The Intervention

Although a vaccine against smallpox was created by Edward Jenner in 1798, eradication of smallpox became a practical goal only in the 1950s when the vaccine could be mass produced and stored without refrigeration. A later breakthrough came in the form of the bifurcated needle, a marvel of simple technology that dramatically reduced costs by allowing needles to be reused endlessly after sterilization and by requiring a far smaller amount of vaccine per patient then

had previously been the case. The needle also made vaccination easy, thereby reducing the time and effort required to train villagers in its use.

In 1959, WHO adopted a proposal to eradicate smallpox through compulsory vaccination, but the program languished until 1965, when the United States stepped in with technical and financial support. A Smallpox Eradication Unit was established at WHO, headed by Dr. D.A. Henderson of the Centers for Disease Control and Prevention (CDC) in the United States. As part of the smallpox eradication program, all WHO member countries were required to manage program funds effectively, report smallpox cases, encourage research on smallpox, and maintain flexibility in the implementation of the smallpox program to suit local conditions.

The Smallpox Eradication Unit proved to be a small but committed team, supplying vaccines and specimen kits to those countries that still had smallpox. Although wars and civil unrest caused disruptions in the program's progress, momentum was always regained with new methods and extra resources that focused on containing outbreaks by speedily seeking out new cases with motorized teams, isolating new cases, and vaccinating everyone in the vicinity of the new cases.

This military-style approach proved effective even in the most difficult circumstances. It also took practical account of the facts that (1) it would have been extraordinarily difficult to immunize the whole world against smallpox, and (2) the transmission of the smallpox virus could be stopped by focusing vaccination efforts around new cases.

The Impact

In 1977, the last endemic case of smallpox in the world was recorded in Somalia. In 1980, after additional surveillance and searching, WHO declared smallpox the first disease in history to have been eradicated. Smallpox had previously been eliminated in Latin America in 1971 and in Asia in 1975.[38]

Costs and Benefits

The annual cost of the eradication campaign between 1967 and 1979 was $23 million. For the whole campaign, international donors provided $98 million, and $200 million came from the endemic countries.[32] The United States saves the total of all its contributions every 26 days because it no longer needs to spend money on vaccination or treatment, making smallpox eradication one of the best values in health interventions ever achieved.[35] Estimates for economic loss due to smallpox being endemic in a low- or middle-income country are available only for India. Based on these, it has been estimated that low- and middle-income countries as a whole suffered economic losses related to smallpox of about $1 billion each year at the start of the intensified campaign.[39]

Lessons Learned

The success of the smallpox eradication program can be attributed to the political commitment and leadership exemplified in the partnership between WHO and the U.S. Centers for Disease Control and Prevention. Success in individual countries hinged on having someone who was responsible, preferably solely, for the eradication effort. In addition, small WHO teams made frequent field trips to review progress, and a small number of committed people working in the program were able to motivate large numbers of staff. Moreover, in the days before the Internet and email, the program managers held a monthly meeting in which they exchanged information about the progress of the campaign and the lessons learned from working on it in different countries.

No two national campaigns were alike, which makes flexibility essential in program design. The plan for eradicating smallpox used existing healthcare systems, and it also enabled many countries to improve their health services. This benefited immunization programs more generally and also offset the cost of the initial smallpox campaign.

Monitoring standards were established across the program to constantly evaluate progress against agreed benchmarks. Community participation provided strategic lessons for later community-based projects. The value of publicity was highlighted when news about the program's progress triggered large donations in 1974 to complete eradication in five remaining countries. An important discovery made during the campaign was that immunization programs could vaccinate people with more than one vaccination at a time. This helped to pave the way for routine immunization.

The eradication of smallpox continues to inspire efforts against other diseases, but it must be remembered that the particular features of smallpox made it a prime candidate for eradication. The disease was passed directly between people, without an intervening carrier, so there were no reservoirs; the distinctive rash of smallpox made diagnosis easy; survivors gained lifetime immunity; and the severity of symptoms, once the disease became infectious, made patients take to their beds and infect few others. Good vaccination coverage could therefore disrupt transmission entirely. Unfortunately, almost 30 years after eradication, funds are still allocated to precautionary measures against the disease because of the continuing threat of smallpox being used as an agent of bioterrorism.

CENTRAL MESSAGES OF THE BOOK

Because this is the introductory chapter of the book, it does not end with a summary, as the other chapters do. Rather, it is more valuable to end this chapter by highlighting some of the central messages of the book as a whole. They are listed here, without citations or recitation of the evidence behind them. That evidence is provided and cited in the chapters that follow. It is very important to keep these messages in mind throughout the book.

- There are strong links among health, human development, labor productivity, and economic development.
- Health status is determined by a variety of factors, including age, culture, income, education, knowledge of healthy behaviors, social status, sex, genetic makeup, and access to health services. The economic and social conditions under which people live and government policies also have an important influence on people's health.
- Given the wide range in the determinants of health, it is fundamental in setting health policy to think and act broadly—in some respects more like a minister of finance must think and act, rather than how a minister of health would do so.
- There has been enormous progress in improving health status over the last 50 years in many countries. This is reflected in the substantial increases these countries have witnessed in that period, for example, in life expectancy.
- Some of this progress has come about as a result of overall economic development and improvements in income. However, much of it is due to improvements in public hygiene, better water supply and sanitation, and better education. Increased nutritional status has also had a large impact on improvements in health status. Technical progress in some areas, such as the development of vaccines against childhood diseases and the development of antibiotics, has also improved human health.
- The progress in health status, however, has been very uneven. Hundreds of millions of people, especially poor people in low- and middle-income countries, continue to get sick, be disabled by, or die from preventable causes of disease. In many countries, nutritional status and health status of lower-income people have improved only slowly. In addition, HIV caused an earlier decline in health and nutritional status and life expectancy in a number of countries in sub-Saharan Africa.
- There are enormous disparities in health status and access to health services both within and across countries. Wealthier people in most countries have better health status and better access to health services than poorer people. In general, urban dwellers and ethnic majorities enjoy better health status than rural people and disadvantaged ethnic minorities. In addition, women face a number of unique challenges to their health, as do lesbian, gay, bisexual, and transgender people (LGBT), prisoners, and other marginalized people.
- Countries do not need to be high-income to enjoy good health status. By contrast, there are a number of examples, such as China, Costa Rica, Cuba, Kerala state in India, and Sri Lanka, that make clear that low-income countries or low-income areas within countries can help their people to achieve good health, even in the absence of extensive financial resources to invest in health. However, this requires strong political will and a focus on public hygiene, education, and low-cost but high-yielding investments in nutrition and health.
- In this light, when considering health policy, one must always seek value for money and ask: "If I only had $100 to spend, how should I spend it to achieve the maximum health gains for the key groups, at least cost?"
- The burden of disease is evolving in light of economic and social changes, the aging of populations, and scientific and technical progress, among other things. The burden of disease is predominantly communicable only in sub-Saharan Africa. In all of other regions, the burden of disease is predominantly noncommunicable. In the absence of new communicable disease threats of major importance, the burden of disease is expected to shift universally toward noncommunicable disease.
- Some global health issues can be solved only through the cooperation of various actors in global health. This could include, for example, the eradication of polio.

- An important part of health status is determined by an individual's and families' own knowledge of health and hygiene. People and communities have tremendous abilities to enhance their own health status.
- Nonetheless, political circumstances, the quality of governance, and the level of government commitment to equity all have an important bearing on the health of a people.
- The world continues to shrink at a very rapid pace. For health, security, and humanitarian reasons, each of us should be concerned about the health of everyone else.
- Taking account of these points, we could say, in many respects that low-income countries should focus on "burying old people, instead of young people, making the transition as fast as possible, and doing so at least cost."
- Taking account of these points, we could also say, in many respects, that the health goals for all countries are to enable their people, at least cost, to enjoy a healthy life, for as long as possible.

Study Questions

1. What has been among the most important progress in health worldwide over the last 50 years?
2. What are some of the global health challenges that remain to be addressed?
3. How might one define *health*, *public health*, and *global health*?
4. What are some examples of public health activities?
5. What are some examples of global health issues?
6. What are the key differences between the approach of medicine and the approach of public health?
7. What are some of the most important challenges to health globally?
8. Why should everyone be concerned about critical global health issues?
9. What are the Millennium Development Goals, and how do they relate to health?
10. What were some of the keys to the eradication of smallpox? What lessons does the smallpox eradication program suggest for other global health programs?

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