GLOBAL HEALTH

Diseases, Programs, Systems, and Policies

THIRD EDITION

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Foreword

WILLIAM H. FOEGE

The change in this book's title, from *International Public Health: Diseases, Programs, Systems, and Policies* to *Global Health: Diseases, Programs, Systems, and Policies*, is a big change. Why a big change? It was possible in the past to see international health as something physically removed—the object of our endeavors. The term "international" suggested a dichotomy between "national" and the rest of the world. In truth, every place on earth is both local and global. The change in title to "global" suggests a unity to health where we are all in this together and where everything affects everything else. It was never possible to adequately protect the health of citizens in one country without being involved with health everywhere, and the title change acknowledges that fact.

In the Foreword for the last edition, published in 2006, I presented a summary of the field from Sumerian times, through the Colonial period, and then on to missionary medicine, military interests, and the modern era since World War II. The second half of the twentieth century was remarkable for the development of global agencies, such as the World Health Organization, UNICEF, the World Bank, and UNDP; large nongovernmental agencies (NGOs) such as CARE and Save the Children; small NGOs by the thousands; bilateral health programs; and the improvement in resources available because of foundations such as the Rockefeller Foundation and the Bill and Melinda Gates Foundation. At the same time that this activity was happening, there was also an evolution in focus from tropical diseases to the health problems of poor countries.

Despite all of the enthusiasm that welcomed the last edition of this book, it is now clear that the past five years have been the most eventful in the history of global health. Suddenly the academic world has changed. In the past, except at a handful of schools, global health—if taught at all—was taught because a single person or a small group had a special interest in the subject. Rarely was it an institutional priority. Today, however, the United States has between 150 and 200 global health programs in institutions of higher learning in both undergraduate and graduate departments. In some universities, this subject has become a school-wide priority, not limited to the health schools. Students in medical schools and schools of public health eagerly seek out courses and experiences in global health. In fact, in some schools of public health, global health is the greatest magnet for new students. It is as if the thirst for knowledge and experience in this field is almost unquenchable.

New tools could narrow what has been a widening gap between the health of poor countries and rich countries. The second anticancer vaccine, directed at the human papillomavirus, holds promise to reduce the toll of cervical cancer in resource-poor areas. The Rotovirus vaccine could save many children in poor countries. A malaria vaccine is in human trials, and a variety of tuberculosis vaccines are now undergoing human trials. This wave of development seems to be a harbinger of what the future holds.

A revolution in support from pharmaceutical companies, accelerated by the gift of Mectizan by Merck for river blindness, has introduced a robust new chapter in global health. Coalitions unimagined in the past are so commonplace that they receive scant notice. A partnership between Merck, the Harvard School of Public Health AIDS Initiative, the Gates Foundation, and the government of Botswana has reduced the HIV-positivity rate of newborns in Botswana from 40% to 4% in a decade. The Jimmy Carter Center has demonstrated the power of involving the political leaders of countries, as it has worked toward reducing river blindness, filariasis, and Guinea worm. The reality of global health today exceeds the dreams of global health practitioners of the past.

Creativity is harnessing new technologies to old problems. For example, the chronic problem of adulterated drugs in Africa might be solved by a scratch-off area on each vial that reveals numbers. A phone number reached by cell phone, followed by the numbers on the vial, would provide immediate feedback regarding the authenticity of that vial. Global health workers have always had a reputation as problem solvers, but now they can tie that ability to technology that ably helps solve problems for many others as well.

Students entering the global health field will have the ability to far surpass the efforts of their predecessors. Now is an absolutely exciting time to engage in the effort to narrow the health gap between poor and rich countries.

But make no mistake: poverty is still the great barrier. It is the major social determinant of health status and is dose related—that is, health status deteriorates with every reduction in financial status. Global health workers will need to be as creative in countering poverty as they are in countering microorganisms. Keeping people healthy is a start toward keeping them productive. Just as coalitions have become standard between corporations, foundations, governments, and NGOs in improving health, so global health workers must now extend their efforts to coalitions that attack poverty. This effort means countering the many other social forces impeding health, through microcredit, employment, education, and opportunities of all kinds.

Drs. Merson, Black, and Mills have once again brought a comprehensive textbook that helps us make sense of an enlarging and confusing field. It is an enormously valuable guide for students, teachers, and practitioners that helps to map out the journeys of those who will change the future.

Introduction

MICHAEL H. MERSON, ROBERT E. BLACK, AND ANNE J. MILLS

The three of us are privileged to serve as faculty at universities that provide education to hundreds of graduate and undergraduate students who are motivated to learn about global health issues and challenges. Many of these students plan to or have already begun careers in global health research, policy, practice, teaching, or administration. This textbook is written for these students around the world, as well as for those who teach and mentor them. In this Introduction, we define global health, provide a brief history of the field, and summarize its many challenges. We then explain how we put this third edition together and how we think it can best be used.

Why Global Health?

Those of you who are familiar with this textbook will have likely realized at first glance that we have changed part of its title from *International Public Health* to *Global Health*. This change reflects the fact that, since the previous edition was published, we have witnessed a major surge in interest in global health, both as a concept and as an area of academic study. Essentially, global health has replaced international health both in concept and reality (Koplan et al., 2009).

International public health, as we defined the term in the previous editions, focuses on the application of the principles of public health to health problems and challenges that affect low- and middle-income countries and to the complex array of global and local forces that influence them. Global health maintains this focus, but places much greater emphasis on health issues that concern many countries or that are affected greatly by transnational determinants, such as climate change or urbanization. This greater emphasis on the scope, in addition to the location, of health problems opens up the opportunity to address cross-border issues as well as domestic health disparities in high-income countries.

Moreover, while international public health primarily applies the principles of public health, there is now agreement that success and progress in improving health around the world requires a multidisciplinary and interdisciplinary approach that includes, yet extends beyond, public health. Professionals from many disciplines and academic fields possess the skills and knowledge needed to understand the various determinants of health and develop strategies that will address these determinants, thereby sharing goals to improve the health of populations. These disciplines and professional fields include social and behavioral sciences (including sociology, economics, psychology, anthropology, political science, and international relations), biomedical and environmental sciences, engineering, business and management, public policy, law, history, and divinity. Furthermore, while efforts to reduce health disparities should focus on prevention, inequalities in treatment, care, and curative strategies must also be addressed when developing solutions to global health challenges, further emphasizing the need for a multidisciplinary approach.

In addition, while social justice—an essential element of public health—should continue to be a central pillar of health, the approach to achieving health equity and finding solutions to reducing health disparities must now much more strongly emphasize global cooperation. Rather than following a model that transfers ideas and resources from high-income countries, organizations, or funding agencies to low-income settings, it is imperative to pursue "a real partnership, a pooling of experience and knowledge, and a two-way flow between developed and developing countries" when implementing health interventions or programs (Koplan et al., 2009).

For all of these reasons, we have embraced the concept of global health and incorporated it in the title of this textbook. Today, there is a greater awareness that we live in an increasingly connected world, and the way in which we view health is no exception. The challenges to reduce health disparities are considerable, and the tenets of global health provide a unique insight and strategic approach to addressing them.

Given this evolution in our thinking, there has been an understandable interest in defining global health. In 1997, the U.S. Institute of Medicine (IOM)

released a report that broadly defined global health as "health problems, issues, and concerns that transcend national boundaries, may be influenced by circumstances or experiences in other countries, and are best addressed by cooperative actions and solutions." More than 10 years later, IOM amended its definition, describing global health "not just as a state but also as the *goal of improving health for all people by reducing avoidable disease, disabilities, and deaths* [emphasis added]"(Committee on the U.S. Commitment to Global Health, 2009).

We prefer the definition of global health that was adopted by the Consortium of Universities for Global Health (CUGH). CUGH was recently formed to promote, facilitate, and enhance the growth of global health as an academic field of study. It has defined global health as follows:

> [A]n 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. (Koplan et al., 2009)

When providing this definition, an effort was made to explain the differences between public health, international health, and global health. While these terms certainly share areas of overlap, this comparison helps to draw out global health's distinctive qualities, some to which we have referred previously (Exhibit I-1).

A Brief History of Global Health

Tracing the roots of global health brings us to the history of international public health. This history encompasses the origins of public health and can be viewed as a history of how populations experience health and illness; how social, economic, and political systems create the possibilities for healthy or unhealthy lives; how societies create the preconditions for the production and transmission of disease; and how people, both as individuals and as social groups, attempt to promote their own health or avoid illness

Exhibit I-1 **Global Health, International Health, and Public Health**

Global Health	International Health	Public Health
Focuses on issues that directly or indirectly impact health but can transcend national boundaries.	Focuses on health issues of countries *other* than one's own, especially those of low- and middle-income countries.	Focuses on issues that impact the health of the *population* of a particular community or nation.
Development and implementation of solutions often require global cooperation.	Development and implementation of solutions usually involve binational cooperation.	Development and implementation of solutions usually do not involve global cooperation.
Embraces both prevention in populations and clinical care of individuals.	Embraces both prevention in populations and clinical care of individuals.	Mainly focused on prevention programs for populations.
Health equity among nations and for all people is a major objective.	Seeks to help people of other nations.	Health equity within a nation or community is a major objective.
Highly interdisciplinary and multidisciplinary within and beyond health sciences.	Embraces but has not emphasized multidisciplinarity.	Encourages multidisciplinary approaches, particularly within health sciences and with social sciences.

(Rosen & Morman, 1993). A number of authors have documented this history (Arnold, 1988; Basch, 1999; Leff & Leff, 1958; Rosen & Morman, 1993; Winslow & Hallock, 1933). A brief history is presented here primarily to provide a perspective for the challenges that face us today (Exhibit I-2).

The Origins of Public Health

It is difficult to select a date for the origins of the field of public health. Some would begin with Hippocrates, whose book *Airs*, *Waters*, *and Places*, published around 400 BC, was the first systematic effort to present the causal relationships between environmental factors and disease and to offer a theoretical basis for an understanding of endemic and epidemic diseases. Others would cite the introduction of public sanitation and an organized water supply system by the Romans in the first century AD. Many would select the bubonic plague (or Black Death) pandemic of the fourteenth century, which began in Central Asia; was carried on ships to Constantinople, Genoa, and other European ports; and then spread inland, killing 25 million persons in Europe alone. In response to this devastating infectious disease, the Great Council of the city of Ragusa (now Dubrovnik, Croatia) followed a contagion theory, which recommended the separation of healthy and sick populations, and issued a document stating that outsiders entering the city must spend 30 days in the restricted location of nearby islands (Stuard and NetLibrary, 1992). The length of time for this isolation period, dubbed *trentino*, was eventually increased from 30 to 40 days, introducing the concept of the modern quarantine (Gensini et al., 2004).

The Middle Ages was also the period when many cities in Europe, particularly through the formation of guilds, took an active part in founding hospitals and other institutions to provide medical care and social assistance. It was also a time when many European countries expanded their horizons abroad, exploring and colonizing new lands. The travelers brought some diseases with them (e.g., influenza, measles, smallpox), and those who settled in these colonial outposts were forced to confront diseases that had never been seen in Europe (such as syphilis, dysentery, malaria, and sleeping sickness). European explorers also brought new pathogens from one part of Africa to another and from one area of the globe to another

Exhibit I-2 The History of Global Health: A Summary

400 BC: Hippocrates presents the causal relationship between environment and disease.

First century AD: Romans introduce public sanitation and organize a water supply system.

Fourteenth century: The "Black Death" (bubonic plague) leads to quarantine and *cordon sanitaire*.

Middle Ages: Colonial expansion spreads infectious diseases around the world.

1750–1850: The Industrial Revolution results in extensive health and social improvements in cities in Europe and the United States.

1850–1910: Knowledge about the causes and transmission of communicable diseases is greatly expanded.

1910–1945: Reductions in child mortality occur. Schools of public health and international foundations and intergovernmental agencies interested in public health are established.

1945–1990: The World Bank and other UN agencies are created. WHO eradicates smallpox. The HIV/AIDS pandemic begins. The Alma Ata Conference gives emphasis to primary health care. UNICEF leads efforts to ensure universal childhood immunization. Greater attention is given to chronic diseases.

1990–2000: Priority is given to health-sector reform, the impact of and responses to globalization, cost-effectiveness, and public–private partnerships in health.

2000–2010: Priority is given to equity, social determinants of health, health and development, use of innovative information and communications technologies, achievement of the Millennium Development Goals (MDGs), and response to influenza.

(e.g., from Africa to North America through the slave trade). On long voyages, however, the greatest enemy of the sailor was often scurvy—at least until 1875, when the British government issued its famous order that all men-of-war should carry a supply of lemon juice.

The Age of Enlightenment (1750–1830) was a pivotal period in the evolution of public health. It was a time of social action in relation to health, as reflected by the new interest taken in the health problems of specific population groups. During this period, rapid advances in technology led to the development of factories. In England and elsewhere, this industrialization was paralleled by expansion of the coal mines. The Industrial Revolution had arrived. During this period, the populations of the cities of England and other industrialized nations grew enormously, creating many unsanitary conditions that caused outbreaks of cholera and other epidemic diseases, which ultimately resulted in high rates of child mortality. Near the end of this period, significant efforts were made to address these problems. Improvements were made in urban water supplies and sewerage systems, municipal hospitals arose throughout cities in Europe and the east coast of the United States, laws were enacted limiting children's ability to work, and data on deaths and births began to be systematically collected in many places.

As industrialization continued, it became obvious that more efforts to protect the health of the public were needed. These changes occurred first in England, which is regarded as the first modern industrial country, through the efforts of Edwin Chadwick. Beginning in 1832, he headed up the royal Poor Law Commission, which undertook an extensive survey of health and sanitation conditions throughout the country. The work of this commission led in 1848 to the Public Health Act, which created a General Board of Health that was empowered to appoint local boards of health and medical officers of health to deal effectively with public health problems. The impact of these developments was felt throughout Europe and especially in the United States, where it stimulated creation of health departments in many cities and states.

Cholera, which in the first half of the nineteenth century spread in waves from South Asia to the Middle East and then to Europe and the United States, did the most to stimulate the formal internationalization of public health. The policy of establishing a *cordon sanitaire*—an action applied by many European nations in an effort to control the disease—had become a major influence on trade, necessitating an international agreement. In 1851, the First International Sanitary Conference was convened in Paris to discuss the role of quarantine in the control of cholera as well as of plague and yellow fever, which were causing epidemics throughout Europe. Although no real agreement was reached, the conference laid the foundations for international cooperation in health.

The latter part of the nineteenth century was distinguished by the enormous growth of knowledge in the area of microbiology, as exemplified by Louis Pasteur's proof of the germ theory of disease, Robert Koch's discovery of the tubercle bacillus, and Walter Reed's demonstration of the role of the mosquito in transmitting yellow fever. Between 1880 and 1910, the etiological cause and means of transmission of many communicable diseases were discovered in laboratories in North America and Europe. The development of this knowledge base was paralleled by related discoveries in the sciences of physiology, metabolism, endocrinology, and nutrition. Dramatic decreases soon were seen in child and adult mortality through improvements in social and economic conditions, discovery of vaccines, and implementation of programs in health education. The way was now clear for the development of public health administration based on a scientific understanding of the elements involved in the transmission of communicable diseases.

The first two decades of the twentieth century witnessed the establishment of three formal intergovernmental public health bodies: the International Sanitary Bureau to serve nations in the western hemisphere (in 1904); l'Office Internationale d'Hygiene Publique in Paris, which was concerned with prevention and control of the main quarantinable diseases (in 1909); and the League of Nations Health Office (LNHO) in Geneva, which provided assistance to member states on technical matters related to health (in 1920). In 1926, LNHO commenced publication of *Weekly Epidemiological Record*, which evolved into a weekly publication of the World Health Organization (WHO). LNHO also established many scientific and technical commissions, issued reports on the status of many infectious and chronic diseases, and sent its staff around the world to assist national governments in dealing with their health problems.

In North America and countries in Europe, the explosion of scientific knowledge in the latter part of the nineteenth century and the belief that social problems could be solved stimulated medical schools, such as Johns Hopkins University, to establish schools of public health. In France, public subscriptions helped to fund the Institut Pasteur (in honor of Louis Pasteur) in Paris, which subsequently developed a network of institutes throughout the francophone world that produced sera and vaccines and conducted research

on a wide variety of tropical diseases. Another significant development during this period was the founding of the Rockefeller Foundation (in 1909) and its International Health Commission (in 1913). During its 38 years of operation, the commission cooperated with many governments in campaigns against endemic diseases such as hookworm, malaria, and yellow fever. The Rockefeller Foundation also provided essential financial support to help establish medical schools in China, Thailand, and elsewhere, and later supported international health programs in a number of American and European schools of medicine and public health. All of these developments were paralleled by the development and strengthening of competencies in public health among the militaries of the United States and the countries of Europe, stimulated in great part by the buildup to and realities of World War I. Following the war, there was increasing recognition that much ill health in the colonial world was not easily solvable with medical interventions and was intractably linked to malnutrition and poverty.

Some historians would date the beginning of international public health to the end of World War II. The end of European colonialism, the need to reconstruct the economies of the United States and the countries of Western Europe, and the rapid emergence of newly independent countries in Africa and Asia led to the creation of many new intergovernmental organizations. The United Nations Monetary and Financial Conference, held in Bretton Woods, New Hampshire, and attended by representatives from 43 countries, resulted in the establishment of the International Bank for Reconstruction and Development (more commonly known as the World Bank) and the International Monetary Fund. The former initially lent money to countries only at prevailing market interest rates, but beginning in 1960 also provided loans to poorer countries at much lower interest rates and with far better terms through its International Development Association. It was not until the early 1980s that the World Bank began to accelerate greatly its provision of loans to countries for programs in health and education. By the end of the decade, however, these loans were the greatest source of foreign assistance to low- and middle-income countries (Ruger, 2005).

In the decade after World War II, many other United Nations organizations (e.g., the United Nations Children's Fund, or UNICEF) and specialized agencies (such as WHO) were formed to assist countries in strengthening their health and other social sectors. In addition, most of the wealthier industrialized countries established agencies or bureaus that funded bilateral projects in specific low- and middle-income countries. For the former major colonial powers, such assistance was most often provided to their former colonies.

Many of the international health efforts in the 1960s and 1970s were dedicated to the control of specific diseases. A global effort to control malaria was hampered by a number of operational and technical difficulties, including the vector's increasing resistance to insecticides and the parasite's resistance to available antimalarial drugs. In contrast, the campaign to eradicate smallpox, led by WHO, successfully eliminated the disease in 1981 and stimulated the establishment of the Expanded Program on Immunization, which focused on the delivery of effective vaccines to infants. Also, during the 1970s, two large international research programs were initiated under the co-sponsorship of various United Nations agencies: the Special Program for Research on Human Reproduction (focusing on development and testing of new contraceptive technologies) and the Tropical Disease Research Program (providing support for the development of better means of diagnosis, treatment, and prevention of six tropical diseases, including malaria). Greater attention also was gradually given to chronic diseases, such as cardiovascular and cerebrovascular diseases and cancer.

In 1978, WHO organized a conference in Alma Ata in the former Soviet Union that gave priority to the delivery of primary healthcare services and the goal of "health for all by the year 2000." Rather than focusing solely on control of specific diseases, this conference called for international efforts to strengthen the capacities of low- and middle-income countries to extend their health services to populations with poor access to prevention and care. The concerns of tropical medicine, which were concentrated on the infectious diseases of warm climates, were replaced by an emphasis on the provision of health services to reduce morbidity and premature mortality in resource-poor settings (De Cock et al., 1995). Given the limited financial and managerial capacities of many governments, increased attention was paid to the role of nongovernmental organizations (NGOs) in providing these services. As a result, many mission hospitals, particularly in sub-Saharan Africa, expanded their activities in their local communities, the number of local NGOs began to increase, and a number of international NGOs (e.g., Save the Children, Oxfam, Médecins sans Frontières) greatly expanded their services, often with support of bilateral agencies. Disease-specific efforts—most notably UNICEF's Child Survival Program, with its acronym GOBI (growth charts, oral rehydration, breastfeeding, immunization) and its goal of universal childhood

immunization by 1990—were seen by many as programs that both focused on specific health problems and provided an excellent means of strengthening health systems.

The emergence of what is sometimes called "the new public health" was heralded by the Ottawa Charter of 1986, which was meant to provide a plan of action to achieve the "health for all" targets set forth at Alma Ata. The Ottawa Charter pioneered the definition of health as a resource for development, not merely a desirable outcome of development. The prerequisites for health that were outlined in the charter were diverse and included peace, shelter, education, food, income, a stable ecosystem, sustainable resources, social justice, and equity. The charter emphasized the importance of structural factors that affect health on a societal level, rather than focusing only on the risk behaviors of individuals. It called on the worldwide health community to address health disparities by engaging and enabling people to take charge of their health at community and policy-making levels. This shift from a "risk behavior" focus to one of "risk environment" continues to resonate in contemporary public health practice and research.

The one new and unexpected development in the 1980s was the arrival of the HIV/AIDS pandemic. By the time a simple laboratory test to detect HIV was discovered in 1985, more than 2 million persons in sub-Saharan Africa had been infected. In 1987, WHO formed the Global Program on AIDS, which within 2 years became the largest international public health effort ever established, with an annual budget of $90 million and 500 staff working in Geneva, Switzerland, and in more than 80 low- and middle-income countries and regions. In 1995, with some 20 million persons (mostly living in these lower-income countries) infected with HIV, and with the understanding that the pandemic could be brought under control only through a multisectoral effort, the program was transformed into a joint effort of UN agencies known as UNAIDS.

The Origins of Global Health

The end of the Cold War ushered in dramatic changes that stimulated the development of the new concept of global health. Major shifts in political and economic ideologies led to a reconsideration of the role of governments, including how they should finance and deliver public services. Much greater attention was given to focusing government's role more narrowly and to making greater use of civil society and the private sector. Indeed, global health as it relates to health systems in the last decade of the twentieth century and the first decade of the twenty-first century can be characterized by its emphasis on health-sector reform, cost-effectiveness as an important principle in the choice of interventions, and public–private partnerships in health, paralleled by a rapid expansion of information and communications technologies.

Although rising incomes have long been known to improve health status, during the past decade increased attention has also been paid to the importance of a healthy population for achieving economic development. Participation of sectors other than the health sector is now viewed as essential for achieving a healthy population. More and more countries, experiencing the demographic transition from societies in which most persons are young to societies with rapidly increasing numbers of middle-aged and older adults, have had to provide preventive and care services that address health problems of both the poor and the wealthy simultaneously. Witness the fact that India and China now have high rates of cardiovascular disease, stroke, and diabetes. Not surprisingly, issues regarding equity in the availability of drugs and vaccines and in access to other technological advances have drawn greater attention. Healthy populations are also now viewed as essential for domestic security.

The first decade of the twenty-first century witnessed the addition of new multifaceted and complex issues to the list of global health challenges—among them, human migration and displacement, bioterrorism, pandemic flu, and disaster preparedness. It is within this context that the United Nations General Assembly adopted the Millennium Declaration in September 2000 as a set of guiding principles and key objectives for international cooperation. The declaration underscored the need to address inequities that have been created or worsened by globalization and to form new international linkages to achieve and protect peace, disarmament, poverty eradication, gender equality, a healthy environment, human rights, and good governance. The goals dealing specifically with development and poverty eradication have become known as the Millennium Development Goals (MDGs); three of them pertain primarily to health (shown in bold in Exhibit I-3). All 191 member states of the UN have pledged to meet the MDGs by 2015.

In the five years since the previous edition of this book was published, there have been a number of noteworthy successes in global health. Notably, significant progress has been made in achieving two of the health-related MDG goals. First, mortality among children younger than age five dropped from 12.4

Exhibit I-3 Millennium Development Goals

- Halve extreme poverty and hunger
- Achieve universal primary education
- Promote gender equality and empower women
- **Reduce under-5 mortality by two-thirds**
- **Reduce maternal mortality by three-fourths**
- **Reverse the spread of HIV/AIDS, malaria, tuberculosis, and other major diseases**
- Ensure environmental sustainability
- Develop a global partnership for development, with targets for aid, trade, and debt relief

million deaths in 1990 to 8.1 million deaths in 2009 (WHO, 2011b). Second, some progress has been made in improving maternal health outcomes, as evidenced by the nearly 20% increase between 1980 and 2008 in the proportion of women in low- and middle-income countries who received skilled assistance during delivery (WHO & UNICEF, 2010) and a decrease from 526,300 global maternal deaths in 1980 to 342,900 maternal deaths worldwide in 2008 (Hogan et al., 2010). It is estimated that approximately 289 million insecticide treated nets were delivered to sub-Saharan Africa by the end of 2010, enough to cover 76% of the 765 million persons at risk of malaria (WHO, 2010). The number of people who become infected annually with HIV appears to have peaked at 3.5 million in 1996 and then declined to 2.6 million in 2009, while the number of deaths due to AIDS appears to have peaked at 2.2 million in 2005 and then dropped to 1.8 million in 2009 (United Nations, 2009; WHO, 2011b).

The recent successes in fighting malaria and HIV are attributable in great part to the expansion of access to treatment, financed primarily by the Global Fund to Fight AIDS, Tuberculosis and Malaria and the President's Emergency Fund for AIDS Relief (PEPFAR), the latter now being part of the U.S. government's Global Health Initiative. Both these initiatives were outcomes of the UN's Special Session on HIV/AIDS, convened in June 2001, and its adoption of a Declaration of Commitment on HIV/AIDS. Moreover, the Global Fund's performance-based funding and decision-making processes have made important contributions to the practice of aid, particularly in encouraging management for results, participation of civil society, mutual accountability, and wide-based country and local ownership. The recent involvement of the G8 countries in setting aid targets in global health and development has also been instrumental in ensuring donor country support to address health problems in lower-income countries (Kurokawa et al., 2009).

Current Challenges in Global Health

We have witnessed major improvements in the health of populations over the past century, with the pace of change increasing rapidly in low- and middle-income countries since the Bretton Woods Conference. Global health—and, more broadly, an improved understanding of how social, behavioral, economic, and environmental factors influence the health of populations—has contributed to these improvements to an extent far greater than expanded access to medical care. Nevertheless, these improvements have not been universal and the challenges of global health have never been greater. For example:

- Despite recent progress, millions of children younger than the age of five whose lives could be saved through access to simple, affordable interventions continue to die each year (UNICEF, 2008).
- Hundreds of thousands of women die annually from complications of pregnancy and childbirth. For each of these deaths, at least 20 other women suffer pregnancy-related health problems that can be permanently disabling and have social consequences (WHO & UNICEF, 2010).
- More than 9.5 million people die each year due to infectious diseases—nearly all of whom live in low- and middle-income countries (WHO, 2008).
- Diarrhea, dysentery, and typhoid are the most prevalent water-related diseases, accounting for more than 90% of deaths and one-third of all outpatient consultations preventable by a safe water supply. Diarrheal disease kills 1.34 million children every year, and it is both preventable and treatable (Black et al., 2010; Disease Control Priorities Project, 2007).
- Noncommunicable diseases (NCDs)—primarily cardiovascular diseases (CVD), cancers, diabetes and chronic lung diseases—are the leading causes of death worldwide and accounted for more than 63% of all global deaths

in 2008. 80% of global deaths from CVD and diabetes happen in low- and middle-income countries.

- The number of deaths from NCDs is expected to increase globally by 15% between 2010 and 2020; a 20% increase is projected in Africa, the Eastern Mediterranean, and South-East Asia (WHO, 2011a).
- While sub-Saharan Africa has 11% of the world's population and 24% of the global burden of disease, it has only 3% of the world's health workers (WHO, 2006).

There is a broad consensus that poverty is the most important underlying cause of preventable death, disease, and disability. Unfortunately, more people live in poverty today than did so 20 years ago. Literacy, access to housing, safe water, sanitation, food supplies, and urbanization are determinants of health status that interact with poverty.

In 2008, the world began facing a new economic crisis. Sharply falling economic growth, declines in trade with low- and middle-income countries, and a downturn in foreign aid flows led to a number of outcomes, including larger numbers of people going hungry, living in extreme poverty, and facing unemployment (United Nations, 2009). The economic recovery now under way likely has created a momentum that will result in a reduction of the overall poverty rate by 15% by 2015, giving reason to believe that that the poverty reduction MDG target can still be met (United Nations, 2010). The most rapid economic growth and the sharpest declines in poverty are occurring in Eastern Asia.

Numerous dynamic challenges face global health practitioners in the twenty-first century. Infectious diseases—once thought to have been vanquished as major killers—have emerged or reemerged around the world as top threats to health and well-being. Some of these are variations of familiar, well-understood microbial agents (e.g., multidrug-resistant tuberculosis), whereas others have traveled from endemic regions to previously unaffected areas (e.g., West Nile virus), and still others have newly emerged (e.g., the coronavirus responsible for severe acute respiratory syndrome [SARS] and the H1N1 influenza pathogen) or are threatening on the horizon (e.g., avian influenza). The underlying causes for many emerging infectious diseases can be traced to human-initiated social and environmental changes, including climatic and ecosystem disturbances, trends in food and meat consumption and production, close proximity of humans and animals in household settings, and unsafe medical practices (Kuiken et al., 2003).

Noncommunicable or chronic diseases were once considered a problem afflicting only high-income nations that had achieved long life expectancies. Today, however, millions of people in low- and middle-income countries suffer from chronic conditions such as obesity, cardiovascular disease, hypertension, and diabetes (Abegunde et al., 2007; WHO, 2011a; Yach et al., 2005). Globalizing forces that have imported Western lifestyle habits, such as tobacco use and increased consumption of processed foods, have fueled these disease trends. Mental illness, and depressive disorders in particular, remain a largely ignored and major source of death and disability worldwide (Prince et al., 2007).

The importance of improving the performance of health systems so as to achieve reductions in mortality and morbidity has become widely accepted, especially the need to address the global health workforce crisis (WHO, 2006). WHO has identified six building blocks of health systems, recognizing that to fight poverty, foster development, and maintain and improve the health of people around the world, the need to strengthen health systems is critical. One means for expanding access to health services has been the use of mobile phone technology; it has been estimated that subscriptions to such services per 100 people reached the 50% mark in 2009 (United Nations, 2010). Mobile phone initiatives are now aimed at improving healthcare services in many countries, as they are increasingly being used for disaster management, reminders for people to get vaccinations, and social marketing. This technology, and others like it, will surely play a pivotal role in the future of global health.

The resources required to achieve the MDGs were initially spelled out by a WHO Commission on Macroeconomics and Health (WHO, 2001) and have subsequently been refined (Sachs & McArthur, 2005). Meeting them will require new forms of international and intersectoral cooperation between UN agencies with an established health role, other international bodies such as the World Trade Organization, regional bodies such as the European Union, bilateral agencies, NGOs, foundations, and the private sector, including pharmaceutical companies. Partners also must include the new philanthropists in global health—people such as Bill and Melinda Gates, George Soros, and Ted Turner—who bring not only significant amounts of funds into the global system but also a new, more informal and personal style of operations. Ensuring the ideal formation and effective functioning of this global health system will itself be an enormous challenge for the next decade of global health.

Use and Content of This Textbook

This textbook has been prepared with these challenges foremost in mind. Its focus is on diseases, programs, health systems, and health policies in low- and middle-income countries, making reference to and using examples from the United States, Western Europe, and other high-income countries as appropriate.[1] Individual chapters present information on health problems and issues that transcend national boundaries and are of concern to many countries.

Our intent has been, first and foremost, to provide a textbook for graduate students from various disciplines and professions who are studying global health. Given its broad range of content, the book as a whole may serve as the main source for an introductory graduate course on global health. Experience with the previous editions has shown that the textbook also can be used as a reference text for undergraduate courses in global health. Alternatively, some chapters (or parts of chapters) can be used in graduate or undergraduate courses dedicated to more specific subjects and topics. Ideally, students who use the textbook in this way will be stimulated to explore other chapters once they have read the assigned material. Moreover, the textbook can serve as a useful reference for those already working in the field of global health in government agencies, as well as those employed by health and development agencies, NGOs, or the private sector.

Because of the many dynamic areas and subjects we wanted to cover, we chose to prepare an edited textbook. We selected content experts for each chapter rather than presuming to have the expertise to write the entire book ourselves. We recognize that an edited textbook has its shortcomings, such as some inconsistency in style and presentation and occasional overlap in chapter content. We have done our best to limit these disadvantages, and hope the reader will agree that those that remain are a small price to pay for fulfilling our goal of providing the reader with the highest-quality content.

Another consequence of the dynamic nature of global health is the occasional difficulty in providing the most up-to-date epidemiologic information on all causes of mortality and morbidity. To assist the reader in obtaining this information, we have provided salient references in various chapters, including Internet resources.

The book that you hold in your hands is the third edition of this textbook. In planning its preparation, we sought advice on how to improve it from many of those who prepared chapters in the first two editions, as well as from faculty in various countries who were using the textbook in their courses. The textbook has 18 chapters, three of which are new and are added in response to input from these reviewers.

The first three chapters set the background. Chapter 1 reviews the importance of using quantitative indicators for decision making in health. It presents the latest developments in the measurement of health status and the global burden of disease, including the increasing use of composite measures of health that combine the effects of disease-specific morbidity and mortality on populations. It then reviews current estimates and future trends in selected countries and regions, as well as the global burden of disease.

Chapter 2 examines the social, cultural, and behavioral parameters that are essential to understanding public health efforts. It does so by describing key concepts in the field of anthropology, particularly as they relate to health belief systems, and by presenting theories of health behavior that are relevant to behavior change and examples of specific national and community programs in various areas of health. The importance of combining qualitative and quantitative methodologies in measuring and assessing health status and programs is emphasized.

The newly added Chapter 3 presents the social determinants of health. It considers this area from a historical perspective, presents contemporary examples of patterns of health inequity arising as a consequence of social determinants, illustrates policy implications of the existence of health gradients, and reviews models and theories that explain how some determinants affect health outcomes. The deliberations of the recent Commission on the Social Determinants of Health serve as a key basis for this chapter.

The next three chapters are devoted to the three greatest public health challenges traditionally faced by low-income countries: reproductive health, infectious diseases, and nutrition. Reproductive health has long been addressed primarily through family planning programs directly intended to reduce fertility. Chapter 4 presents more current views of reproductive health that broaden this concept to include empowerment of women in making decisions about their health and fertility. It provides information on population growth and demographic changes around the world, reviews how women control their fertility, and indexes the

[1] A classification of countries can be found on the World Bank's website: http://www.worldbank.org/data/countryclass/countryclass.html.

effects of various social and biological determinants of fertility. It then examines the impact of family planning services and programs on the reduction of fertility and unwanted pregnancies and on the health of children and women.

Collectively, infectious diseases have historically been the most important causes of premature mortality and morbidity in low- and middle-income countries. Chapter 5 presents the descriptive epidemiologic features and available prevention and control strategies for the communicable diseases that are of greatest public health significance in these countries today. These diseases include the vaccine-preventable diseases; diarrhea and acute respiratory infections in children; tuberculosis, malaria, and other parasitic diseases; HIV/AIDS and other sexually transmitted diseases; and the emerging infectious diseases and new disease threats, including avian flu and H1N1. Examples of successful programs using one or more of the available control approaches—prevention of exposure, immunization, drug prophylaxis, and treatment—are described, as are the challenges and obstacles that confront low- and middle-income countries in successfully controlling these diseases.

Nutritional concerns in low- and middle-income countries are diverse, ranging from deprivation and hunger to consequent deficiencies in health, survival, and quality of life in some regions. Chapter 6 focuses on several spheres of nutrition that are of utmost concern in these countries, including undernutrition and its components of protein malnutrition and micronutrient deficiencies (particularly vitamin A, zinc, iron, and iodine) at various stages of life; food insecurity; the interaction of nutrition and infections; the role of breastfeeding and complementary feeding in ensuring healthy children; and the nutrition transition observed in more affluent segments of populations in rapidly developing countries (an issue that is addressed more fully in Chapter 7's exploration of chronic diseases). Chapter 6 also discusses the cost-effectiveness of nutritional interventions.

The book's next four chapters address public health priorities that have been historically associated with higher-income countries but are gaining importance in resource-poor countries as they become more developed economically and their populations live longer and progress through the demographic transition. These issues are chronic diseases, injury, mental health, and environmental health.

Chronic diseases—frequently called noncommunicable or degenerative diseases—are generally characterized by a long latency period, prolonged course of illness, noncontagious origin, functional impairment or disability, and incurability. Chapter 7 provides an overview of chronic diseases in low- and middle-income countries, with particular attention given to cardiovascular diseases (mainly coronary artery disease and stroke), obesity, common cancers, chronic respiratory diseases, and diabetes. The descriptive epidemiology and economic implication of these diseases, the behavioral risk factors that serve as their determinants, and the main approaches, programs, and policy responses required to adequately prevent and manage these diseases at national and global levels are presented.

The subject of injuries is covered in a separate chapter (Chapter 8), reflecting the greater importance and recognition accorded to this problem. The discussion includes both unintentional injuries (ones for which there is no evidence of predetermined intent, such as road accidents and occupational injuries) and intentional injuries or violence that is planned or intended (including injuries related to self-directed, interpersonal, and collective violence). The chapter provides an overview of the global burden of injuries, outlines the causes of and risk factors for them, describes evidence-based interventions that can successfully reduce their impact, and considers the opportunities and challenges that can move forward an injury prevention agenda at the global level.

It is only recently that mental health has received attention commensurate with its great importance to the disability and disease burden in low- and middle-income countries. Chapter 9 charts the historical development of public mental health; considers various concepts and classifications of mental disorders, taking into account the influence of cultural factors in the development of psychiatric classifications; and reviews what is known about the epidemiology and etiology of the more common disorders, including anxiety and mood disorders, psychotic disorders, substance abuse disorders, epilepsy, developmental disabilities, and dementia. Lastly, the chapter reviews mental health policies, human resources for mental health care, and the evidence for the prevention and treatment of major mental disorders.

Chapter 10 provides a comprehensive review of environmental health issues and problems in low- and middle-income countries. It begins by summarizing the conceptual and methodological issues that constitute the important area of risk assessment and monitoring, and then reviews the profiles of environmental health hazards within the household (e.g., water and sanitation), in the workplace (e.g., on farms, in mines, and in factories), in the community (e.g., outdoor air pollution), and at regional and global levels.

The coverage of regional and global threats includes such controversial topics as climate change, ozone depletion, and biodiversity. The chapter concludes with a discussion of the issues and projects that bear on the future of environmental health research and policy.

Chapter 11 focuses on the global health challenges that characterize complex emergencies. These conflicts occur within and across state boundaries, have political antecedents, are protracted in duration, and are embedded in existing social, political, economic, and cultural structures and cleavages. At the end of 2008, there were an estimated 27 million internally displaced persons and more than 14 million refugees seeking asylum across international borders, the vast majority of whom were fleeing conflict zones. Chapter 11 considers the causes of complex emergencies (particularly the political causes) and their impact on populations and health systems, and reviews the technical interventions that can limit their adverse effects on the health of populations. Attention is drawn to the importance of an effective and efficient early response in influencing the long-term survival of populations and health systems and the nature of any postconflict society that is established. The chapter also reviews the impact of natural disasters.

The next two chapters are concerned with the development and implementation of effective health systems, which have a crucial influence on the ability of countries to address their disease burden and improve the health of their populations. Chapter 12 focuses on the design of health systems considered largely from an economic perspective. It provides a conceptual map of the health system along with its key elements; addresses the fundamental and often controversial question as to the role of the state; and considers the key functions of any health system, which include regulation, human resources for health, financing, pay-for-performance approaches, and provision. It concludes by reviewing current trends in health system reform. Four country examples are used throughout the chapter to illustrate key differences in health systems across the world.

As multipurpose and multidisciplinary endeavors, health systems require coordination among numerous individuals and units. Thus they require effective and efficient management. Chapter 13 is dedicated to this topic, which is defined as the process of making decisions as to how resources will be generated, developed, and used in pursuit of particular organizational objectives. It details the important aspects of the political, social, and economic context in which a management process must operate; discusses the organizational structures under which healthcare systems may be organized, including the role of the private sector; examines the critical process of planning and priority setting; looks at issues in the management of resources, focusing on finance, resource allocation, staffing, transport, and information; and concludes by discussing some cross-cutting themes, such as management style, accountability, and sustainability.

Chapter 14 is a new chapter that is dedicated to the topic of pharmaceuticals, a key part of any health system. It focuses on access, availability (both upstream issues and country-level distribution and management systems), and affordability of pharmaceuticals and their safe and effective use. It also discusses the pharmaceutical system architecture and reflects on coordination and priority setting in a complex global environment.

Health and health systems interrelate with a nation's economy in two main ways. The first, as noted earlier, comprises the bidirectional relationships between health status and national income and development. For example, health affects income through its impact on labor productivity, saving rates, and age structure, while a higher income improves health by increasing the capacity to produce food and have adequate housing and education, and through incentives for fertility limitation. The second concerns linkages between healthcare delivery institutions, health financing (including insurance) policies, and economic outcomes. Chapter 15 reviews information available on both of these challenging and closely related topics, which are critical to government policy makers seeking the best ways to improve the quality of life of their populations, particularly in those countries that carry the heaviest burden of disease and poverty.

Chapter 16, another new chapter, covers the important area of evaluation science and addresses the rationale for and the design of summative impact evaluations of programs being scaled up and delivered to large populations and aimed at delivering several biological and behavioral interventions together. To describe the planning, design, and execution of program evaluations and data analyses, the authors use three evaluations as examples: an integrated management of childhood illness program, an accelerated child survival development initiative, and a voucher scheme for insecticide-treated bed nets.

Chapter 17 presents the current state of affairs regarding global cooperation in international public health. It begins by explaining the reasons why countries seek this cooperation, the processes by which it

occurs, the institutions and actors involved, and the global health initiatives that have been implemented and evaluated. The chapter reviews the important shift that has taken place in the overall framework of international cooperation, from one characterized by vertical relationships between states and international and intergovernmental organizations, to one of horizontal, cooperative participation resulting in partnerships and alliances among nation states, UN agencies, the private sector, and NGOs. This shift has great significance for the formation of future international public health policies and programs and for approaches to global governance in the area of global health.

Chapter 18 provides an overview of how globalization is affecting global health in the twenty-first century. It begins by seeking to define the term "globalization" and its key causes (or drivers), then explores how the many changes engendered by globalization are having positive and negative impacts on human societies. A discussion of the links between globalization and shifting patterns of infectious and chronic diseases follows. Next, the chapter explores the impact of globalization on healthcare financing and service provision, using as examples the migration of health workers and the global spread of health-sector reforms. It discusses global health diplomacy and concludes by suggesting ways in which the global health community can promote and protect health in the era of globalization.

Many case studies can be found in exhibits scattered throughout the text. They provide concrete examples and illustrations of key points and concepts covered in each chapter. At the conclusion of each chapter is a list of questions that can help course instructors stimulate classroom discussions about important issues covered in the chapter.

The editors recognize that this book could include separate chapters on many other topics—maternal and child health, health and human rights, and implementation or delivery science, to name but a few. We have opted instead to provide in-depth information on the core subjects that were selected, although we did our best to cover some aspects of all of these subjects in one or more chapters.

In many ways, global health stands today at an important crossroads. Its greatest challenge is to confront global forces, while at the same time promoting local, evidence-based, cost-effective programs that deal with both disease-specific problems and more general issues, such as poverty and gender inequality. Global health–related research is essential to gain a better understanding of the determinants of illness and of innovative approaches to prevention and care and to find means of improving the efficiency and coverage of health systems. Whether as practitioners, policy makers, or researchers, global health professionals can make an enormous difference by being well trained and highly sensitive to the beliefs, culture, and value systems of the populations with whom they collaborate or serve. We hope this textbook will aid in this process.

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