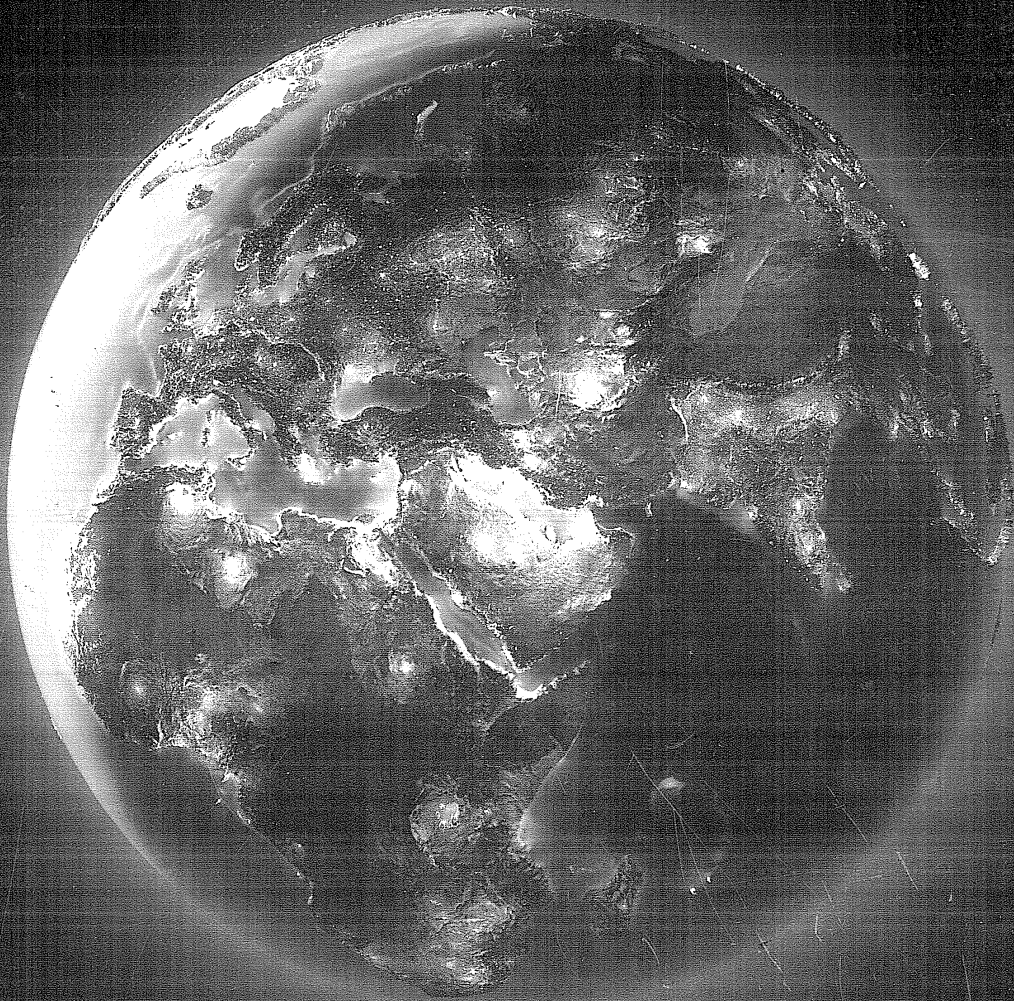


FOURTH EDITION

GLOBAL HEALTH

Diseases, Programs, Systems, and Policies



Michael H. Merson Robert E. Black Anne J. Mills

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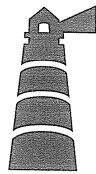
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GLOBAL HEALTH

Diseases, Programs, Systems, and Policies

Global Health: Diseases, Programs, Systems, and Policies, Fourth Edition brings together contributions from the world's leading authorities into a single comprehensive text. It thoroughly examines the wide range of global health challenges facing low- and middle-income countries today and the various approaches nations adopt to deal with them. These challenges include measurement of health status, infectious and chronic diseases, injuries, nutrition, reproductive health, global environmental health, and complex emergencies.

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Designed for graduate-level students, this text provides an expansive view of today's issues and challenges in global health and will be an invaluable resource in the years to come.

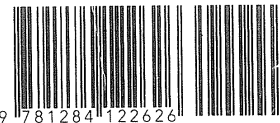
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Introduction

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 every year to hundreds of graduate and undergraduate students 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 text 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 accomplishments and challenges. We then explain how we put this *Fourth Edition* together and how we think it can best be used.

► What Is Global Health?

Global health is a burgeoning field, which has seen a major surge of interest as an area of academic study in the last decade. Essentially, global health has replaced international public health in both concept and reality. International public health focuses on the application of the principles of public health to health problems and challenges that affect low- and middle-income countries (LMICs) and to the complex array of global and local determinants 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 and location of health problems provides the opportunity to address cross-border issues as well as domestic health disparities in high-income countries.

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, treatment, care, and curative strategies must also be addressed when developing solutions to global health challenges. This call for multipronged action further emphasizes the need for a multidisciplinary approach.

In addition, while social justice must 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- and middle-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, p. 1995).

Today we live in an increasingly connected world, but 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” (Board on International Health, 1997, p. 1). 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*” (Committee on the U.S. Commitment to Global Health, 2009, p. 5).

Although a number of other definitions for global health have been proposed, we prefer the definition of global health that was adopted by the Consortium of Universities for Global Health (CUGH). CUGH was 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, p. 1995)

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. (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 the story 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 (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

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 <i>other</i> than one’s own, especially those of LMICs.	Focuses on issues that impact the health of the <i>population</i> 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 multidisciplinary.	Encourages multidisciplinary approaches, particularly within health sciences and with social sciences.

EXHIBIT I-2 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.

14th 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: Significant 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, World Health Organization (WHO), and other United Nations agencies are created. WHO eradicates smallpox. The Alma Ata conference gives emphasis to primary health care. The HIV/AIDS pandemic begins. The United Nations Children’s Fund (UNICEF) leads efforts to ensure universal childhood immunization. Greater attention is given to noncommunicable diseases (NCDs).

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, declaration of the Millennium Development Goals (MDGs), and response to influenza.

2010–2020: Priority is given to climate change’s impact on health, growing burden of NCDs, increasing threat of emerging and re-emerging diseases, global health security, universal health coverage, proliferation of innovative technologies for delivery of prevention and care services, and the declaration of the Sustainable Development Goals (SDGs).

400 BC, was the first systematic effort to present the causal relationships between environmental factors and disease and 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 (“Black Death”) pandemic of the 14th 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 responding 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; it issued a document stating that outsiders entering the city must spend 30 days in the restricted location of nearby islands (Stuard & 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, Yacoub, & Conti, 2004).

The Middle Ages was also the period when many cities in Europe, particularly through the formation of guilds, took an active part in establishing hospitals

and other institutions to provide medical care and social assistance. At the same time, many European countries began to expand their horizons abroad, by 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 carried pathogens from one part of Africa to another, and from one area of the globe to another (e.g., from Africa to North America through the slave trade). On long voyages, 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 as a preventive measure.

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,

sanitaire the populations of the cities of England and other industrialized nations grew enormously, with overcrowded, unsanitary conditions in these urban areas leading to 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, regarded as the first modern industrial country, through the efforts of the noted social reformer 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 19th 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 restraint 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, 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 19th 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 etiologic causes 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 were soon seen in child and adult mortality thanks to 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 principles involved in the transmission of communicable diseases.

The first two decades of the 20th 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, Switzerland, which provided assistance to countries 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) and still is published today. 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 19th century and the belief that social problems could be solved stimulated universities, such as Johns Hopkins, to establish schools of public health. In France, public subscriptions helped to fund the Institut Pasteur (named 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 and public health schools around the world; and later 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 alone, but rather 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 ending 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 were all forces that led to the creation of many new intergovernmental organizations. The United Nations Monetary and Financial Conference, held in Bretton Woods, New Hampshire, in 1944 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 in 1960 it began to provide 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, however, that the World Bank began to accelerate greatly its provision of loans to countries for programs in health and education. By the end of that decade, these loans had become the greatest source of foreign assistance to LMICs (Ruger, 2005).

In the decade after World War II, many other United Nations organizations (e.g., UNICEF) and specialized agencies (such as WHO) were formed to assist countries in strengthening their health, social, and economic sectors. In addition, most of the wealthier industrialized countries established agencies or bureaus that funded bilateral projects in specific LMICs. Among the historical 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, commonly known as noncommunicable diseases (NCDs), such as cardiovascular and cerebrovascular diseases and cancer.

In 1978, WHO organized a conference in Alma Ata in the former Soviet Union that prioritized the delivery of primary healthcare services and set 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 LMICs 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, Lucas, Mabey, & Parry, 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 from 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 a 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, rather than 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. Moreover, 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 an emphasis on “risk environment” continues to resonate in contemporary public health practice and research.

One hugely influential development in the 1980s was the onset of the human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (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 Programme 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 LMICs. In 1995, with some 20 million persons infected with HIV (mostly living in LMICs), 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 the Joint United Nations Programme on HIV/AIDS (UNAIDS). The global response to HIV/AIDS helped to shape the field of global health from its emphasis on intersectoral collaboration, health and human rights, global advocacy for health, and focus on prevention and treatment.

The Origin and Growth 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. Greater attention was given to increasing the role of civil society and the private sector in achieving universal health coverage. Indeed, global health as it relates to health systems in the last decade of the 20th century and the first two decades of the 21st 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 innovative technologies.

Although rising incomes have long been known to improve health status, increased attention has been paid to the relationship between health and poverty, and 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 are experiencing the demographic transition to societies with rapidly increasing numbers of middle-aged and older adults, and in turn are being challenged with providing preventive and care services that address health problems of both the poor and the wealthy simultaneously. Increasing life expectancy, urbanization, and resultant changing lifestyles have contributed to an ever-increasing burden of NCDs. India and China, for example, 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 21st century witnessed the addition of new multifaceted and complex issues to the list of global health challenges—among them, human migration and displacement, bioterrorism, emerging pathogens, climate change, and disaster preparedness. It was 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 became known as the Millennium Development Goals (MDGs); three of them pertained primarily to health (shown in bold in **EXHIBIT I-3**). In addition, Goal 1 included reduction in childhood undernutrition. All 191 member states of the UN pledged to meet the MDGs by 2015.

Building on the achievements of the MDGs (covered later), as well as learning from their limitations, the United Nations adopted the 2030 Agenda for Sustainable Development in 2015. Central to this agenda are the SDGs which comprise 17 goals, 169 associated

EXHIBIT I-3 Millennium Development Goals

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

EXHIBIT I-4 Sustainable Development Goals

Goal 1: End poverty in all its forms everywhere

Goal 2: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture

Goal 3: Ensure healthy lives and promote well-being for all at all ages

Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Goal 5: Achieve gender equality and empower all women and girls

Goal 6: Ensure availability and sustainable management of water and sanitation for all

Goal 7: Ensure access to affordable, reliable, sustainable, and modern energy for all

Goal 8: Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all

Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation

Goal 10: Reduce inequality within and among countries

Goal 11: Make cities and human settlements inclusive, safe, resilient, and sustainable

Goal 12: Ensure sustainable consumption and production patterns

Goal 13: Take urgent action to combat climate change and its impacts

Goal 14: Conserve and sustainably use the oceans, seas, and marine resources for sustainable development

Goal 15: Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss

Goal 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels

Goal 17: Strengthen the means of implementation and revitalize the global partnership for sustainable development

targets, and 230 indicators to guide global sustainable development through to 2030; the goals are shown in **EXHIBIT I-4**. The SDGs seek a more integrated approach to address the challenges of an increasingly global and integrated world. While there is only one health-specific goal—Goal 3: “Good health and well-being”—it has 13 associated targets and there are many linkages between health and the other SDGs and associated targets. For example, Goal 2 includes elimination of nutritional deficiencies. Achieving the SDGs will require consistent monitoring and evaluation and both global and national commitment.

In the years since the previous edition of this text was published, there have been a number of noteworthy successes in global health, partly due to the MDGs. Notably, substantial progress was made in

achieving the three health-related MDG goals cited earlier. First, mortality among children younger than age 5 dropped 56%, from 12.6 million deaths in 1990 to 5.6 million deaths in 2016 (WHO, 2017a). Second, maternal mortality worldwide decreased by 44% between 1990 and 2015 (WHO, 2016b). Third, there was an almost 26% reduction in malaria deaths between 2006 and 2016 (Global Burden of Disease [GBD] Causes of Death Collaborators, 2017). In addition, in 2016, the number of people who were infected annually with HIV declined to 1.8 million—a more than 50% reduction since 1996, when there were 3.5 million new infections. The number of AIDS-related deaths fell by 48% (to 1 million deaths) since the peak in 2005 (UNAIDS, 2017a). In addition, for the first time since the eradication of smallpox, we are

on the verge of eliminating another major global disease from the world: 2017 saw the lowest case count of polio in recorded history (Polio Global Eradication Initiative, 2017).

The recent successes in fighting malaria and HIV/AIDS are attributable in great part to the expansion of access to treatment, financed primarily by the Global Fund to Fight AIDS, Tuberculosis and Malaria (the Global Fund), and the President's Emergency Plan for AIDS Relief (PEPFAR). 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 broad-based country and local ownership.

► 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 LMICs 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 a greater extent than expanded access to medical care. Nevertheless, these improvements have not been universal, disparities between rich and poor both between and within countries remain, and the challenges of global health have never been greater.

Despite recent progress, we still have far to go in terms of maternal and child health. Millions of children still die before reaching the age of 5 due to diseases that could be simply and affordably prevented and treated (UNICEF, 2016). Hundreds of thousands of women continue to die annually from preventable complications of pregnancy and childbirth, and most of these deaths occur in LMICs (WHO, 2016b).

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. Despite recent progress, the AIDS pandemic is far from over. In particular, prevention efforts need to be targeted toward vulnerable populations who are still at high risk for HIV/AIDS, such as girls and young women in sub-Saharan

Africa—a population that accounts for more than 70% of new HIV infections among adolescents. (USAID, 2017)

We have seen infectious diseases travel from endemic regions to previously unaffected areas (e.g., Zika virus), and others newly emerge. The 2013–2016 Ebola outbreak in West Africa was an alarming wake-up call regarding the danger of epidemics in urban areas and the frail state of our global health security. The underlying causes of many emerging infectious diseases can be traced to human-initiated social and environmental changes, including climatic and ecosystem disturbances, trends in food consumption and production, close proximity of humans and animals in household settings, and unsafe medical practices (Kuiken, Fouchier, Rimmelzwaan, & Osterhaus, 2003). This relationship has given rise to the disciplines of One Health, an approach that seeks to address and mitigate the effects on health arising from the interfaces between humans, animals, and environments (Gibbs, 2014) and Planetary Health, which studies the health of human civilizations and the systems—political, economic, and social—on which they depend (The Lancet Planetary Health, 2017). Furthermore, globalization forces, including increased trade and movement of people, have led to far greater opportunities for infectious disease to spread around the world quickly, as evidenced by the severe acute respiratory syndrome (SARS) epidemic in 2002–2003. In 2012, an estimated 12.6 million deaths were attributable to environmental factors, many of which were related to effects of climate change (Pruss-Ustun, Wolf, Corvalan, Bos, & Neira, 2016). Other health consequences of climate change and environmental biodegradation will be experienced through increased water and food insecurity, extreme climatic events, displaced populations, and vulnerable human settlements (Jamison et al., 2013). Resistance to antibiotics is also rising among populations around the globe, making infections harder and more expensive to treat and threatening the gains we have made in combatting infectious diseases.

NCDs were once considered a problem afflicting only high-income nations whose populations had achieved long life expectancies. Today, NCDs are the leading causes of death worldwide; they accounted for more than 70% of global deaths in 2016, an increase of 16% since 2006 (GBD Causes of Death Collaborators, 2017). Ischemic heart disease and stroke are the leading causes of death globally, accounting for 15 million deaths in 2015 (WHO, 2017b). The rise of

NCDs is especially apparent in LMICs, where 78% of global NCD deaths occurred in 2015 (WHO, 2017b). Globalizing forces that have imported Western lifestyle habits, such as increased trade and trade liberalization, tobacco use, and increased consumption of processed foods, have fueled these disease trends. In addition, despite the high burden imposed by mental illness, and especially depressive disorders, and the high percentage of global disability and mortality attributable to them, only recently have these disorders been given the attention they deserve (Summergrad, 2016). As a result of the overall increase in all types of NCDs and the lingering problem of infectious diseases, many LMICs face a double burden of disease, putting more strain on their already frail healthcare systems.

The importance of improving the performance of health systems to achieve reductions in mortality and morbidity has become widely accepted, including the need to address the global health workforce crisis (WHO, 2006). Health systems need adequate resources to meet the changing and growing needs of the populations they serve. An estimated 40 to 50 million new health and social care workers will be needed by 2030 to reach the SDGs, 18 million of whom are needed in LMICs (WHO, 2016a). WHO has identified the critical need to strengthen health systems so as to fight poverty, foster development, and maintain and improve the health of people around the world. It has set the goal of achieving universal health coverage, meaning that all persons can access needed health services of sufficient quality to be effective and not cause financial hardship. As the world faces increasing threats from emerging and re-emerging infectious diseases, strong basic healthcare systems will also be essential to support global health security and to avoid crippling national and global pandemics (Horton, 2018).

One means for expanding access to health services has been the use of mobile phone technology. By 2021, 5.5 billion people are predicted to have access to mobile phones, and more people in Africa will have access to mobile phones than to running water (Thornton, 2017). 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, health screening tests, and social marketing. Emerging drone technology also has been harnessed to improve access to health care by transporting blood, contraceptive products, and medical supplies to remote areas, or during natural disasters. These technologies, and

others like them, will surely play a pivotal role in the future of global health.

In recent years, the growth in the number of refugees and displaced persons around the world has been startling. By the middle of June 2017, more than 65 million people had been forced to leave their homes (United Nations High Commissioner for Refugees, 2017)—the highest number recorded in 70 years (Mohammadi, 2016). In addition to humanitarian and economic repercussions, this population upheaval puts displaced populations at increased risk for both infectious and NCDs due to overcrowding, poor sanitation, and lack of access to health care, and overburdens the health systems in the refugees' host countries.

There is a broad consensus that poverty is the most important underlying cause of preventable death, disease, and disability on a global level. While the number of people living in poverty remains unacceptably high, progress has been made in reducing the global poverty rate: 10.7% of the world population lived below the poverty line in 2013, compared to 42% in 1981 (*The Economist*, 2017). This progress has been partly due to advances made in literacy, access to housing, safe water, sanitation, food supplies, and urbanization. Even so, 50% of the world's extremely poor live in sub-Saharan Africa (Hollenhorst, 2016), reflecting the particular challenges of social and economic development in that region.

Meeting the global health challenges we face today and in the future will require new forms of financing and cooperation. Changing global economies have altered traditional global health funding mechanisms. Contributions to health assistance from donor countries have more or less flattened in recent years, while LMICs are rightfully taking on more responsibility for financing their domestic health sector due in part to the increasing economic growth in these countries. In 2015, for example, domestic resources accounted for 57% of total HIV/AIDS funding (UNAIDS, 2017b). However, many low-income countries are far from being able to raise enough domestic revenue to replace development assistance for health. 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, will need to be enhanced. Global organizations such as the Bill & Melinda Gates Foundation, the Global Fund, and GAVI, the Vaccine Alliance, have taken on significant leadership roles and in many cases have surpassed the older,

more traditional actors in global health governance. These organizations have not only injected significant amounts of funds into the global system, but also brought a new, more informal and personal style of operation. Ensuring the ideal structure, effective functioning, and financing of this global health system will itself be an enormous challenge for the next decade of global health (National Academies of Sciences, Engineering, and Medicine, 2017).

► Use and Content of This Text

This text has been prepared with future global health challenges foremost in mind. Its focus is on diseases, programs, health systems, and health policies in LMICs, 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 issues that transcend national boundaries and are of concern to many countries.

Our intent has been, first and foremost, to provide a text for graduate students from various disciplines and professions who are studying global health. Given its broad range of content, the text 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 it 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 text in this way will be stimulated to explore other chapters once they have read the assigned material. Moreover, the text can serve as a useful reference for those already working in the field of global health in government agencies, 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 text. We selected content experts for each chapter rather than presuming to have the expertise to write the entire text ourselves. We recognize that an edited text has its shortcomings, such as some inconsistencies 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.

This is the fourth edition of the text. In planning its preparation, we sought advice on how to improve it from those who prepared chapters in the first three editions, as well as from faculty in various countries who were using the text in their courses; we also examined important current and emerging trends in global health. The text has 21 chapters, including four new chapters that have been added in response to feedback from these reviewers.

The first four chapters set the background. The *Measures of Health and Disease in Populations* chapter 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.

The *Culture, Behavior, and Health* chapter examines the social, cultural, and behavioral parameters that are essential to understanding public health efforts. This chapter describes key concepts in the field of anthropology, particularly as they relate to health belief systems. It presents theories of health behavior that are relevant to behavior change with 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 1946 WHO constitution established that “the highest attainable standard for health as a fundamental right of every human being” (WHO, 2014, p. 1). The *Global Health, Human Rights and Ethics* chapter is new to this edition of the text in recognition of the inextricable link between human rights and health.

¹A classification of countries can be found on the World Bank’s website: <https://datahelpdesk.worldbank.org/knowledgebase/topics/19280-country-classification>.