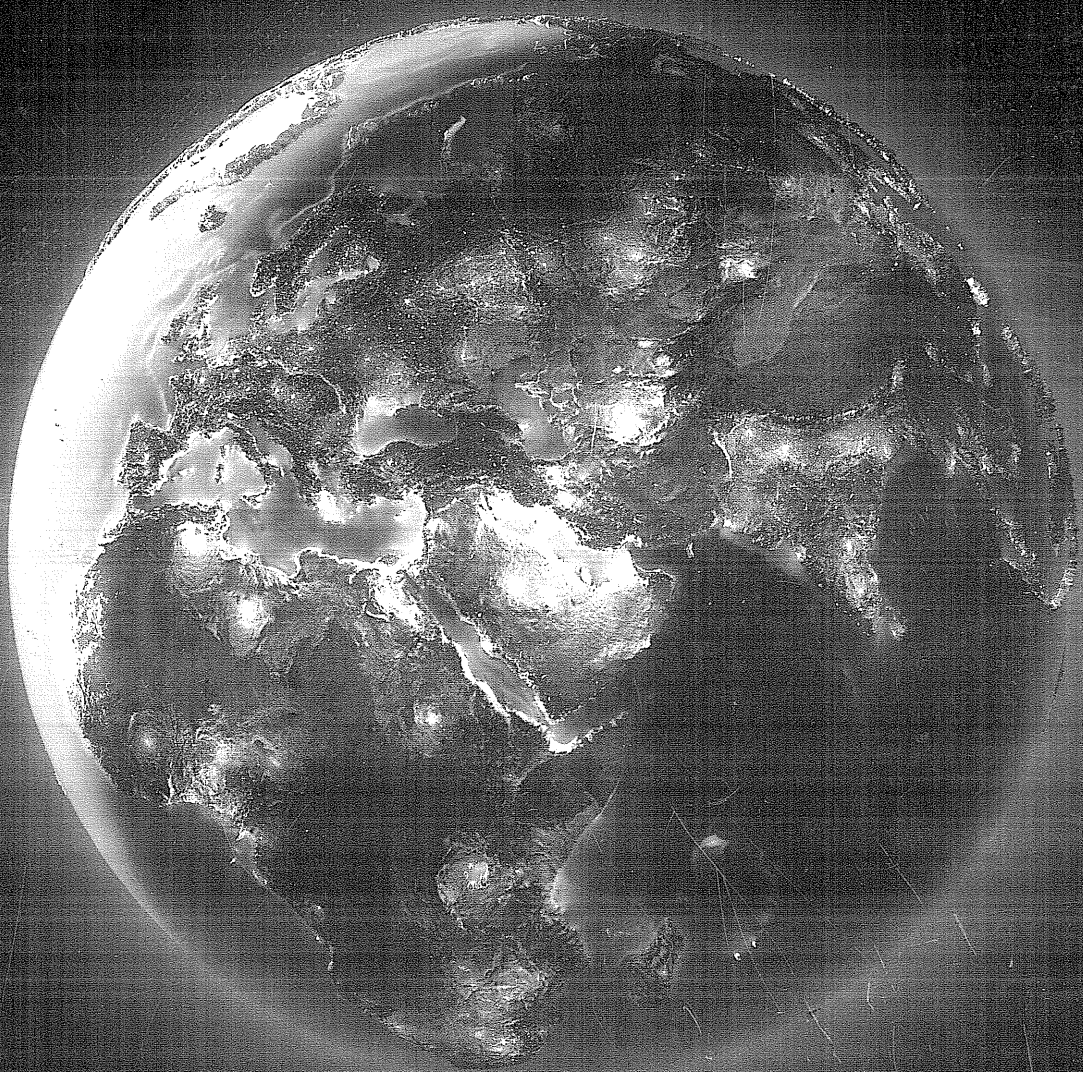
FOURTH EDITION

GLOBAL HEALTH

Diseases, Programs, Systems, and Policies



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

FOURTH EDITION

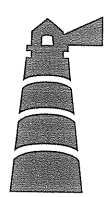
GLOBAL HEALTH

Diseases, Programs, Systems, and Policies

Michael H. Merson, MD
Wolfgang Joklik Professor of Global Health
Duke Global Health Institute
Duke University
Durham, North Carolina

Robert E. Black, MD, MPH
Professor and Director
Institute for International Programs
Department of International Health
Johns Hopkins Bloomberg School of Public Health
Baltimore, Maryland

Anne J. Mills, PhD
Professor and Deputy Director and Provost
London School of Hygiene & Tropical Medicine
London, UK



JONES & BARTLETT
LEARNING

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

FOURTH EDITION

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.

The book also explores the financing and management of emerging health systems as well as the roles of nation states, international agencies, the private sector, and nongovernmental organizations in promoting health.

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.

Updated throughout to reflect new and emerging issues, the *Fourth Edition* offers:

- **Five new chapters:** Global Health, Human Rights, and Ethics; Public Health Infrastructure; Innovation, Technology, and Design; International Trade and Health; and Global Health Governance and Diplomacy
- **Case studies throughout the text** provide concrete examples of key points and concepts in each chapter
- **Contributions from leading experts** in their fields in both new and existing chapters

JONES & BARTLETT LEARNING
An Ascend Learning Company
www.jblearning.com

ISBN: 978-1-284-12262-6
9 781284 122626

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 *other* than one's own, especially those of LMICs.	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.

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 become 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 climactic 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.

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

CHAPTER 1

Measures of Health and Disease in Populations

Abdulgafoor M. Bachani and Adnan A. Hyder

In its 1948 charter, the World Health Organization (WHO) defined health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." Although this is an important ideological conceptualization, for most practical purposes, objectives of health programs are more readily defined in terms of prevention or treatment of disease. Disease has been defined in many ways and for a variety of reasons; distinctions may be made between disease, sickness, and illness. For purposes of defining and measuring disease burden, a general definition will be used in this text: *Disease* is anything that a person experiences that causes, literally, "dis-ease"—that is, anything that leads to discomfort, pain, distress, disability of any kind, or death constitutes disease. It may be due to any cause, including injuries or psychiatric conditions.

It is also important to be able to diagnose and classify specific diseases to the extent that such classification aids in determining which health intervention programs would be most useful. Thus, defining disease, understanding the pathogenesis of the disease process, and knowing which underlying risk factors lead to this process are critical for understanding and classifying causes so as to determine the most effective prevention and treatment strategies for reducing the effects of a disease or risk factor. Just as the purpose of diagnosis of a disease in an individual patient is to provide the right treatment, so the major purpose of working through a burden of disease analysis in a population is to provide the basis for the most effective mix of health and social program interventions.

Developments in the measurement of population health status and disease burden over the past two decades include the increasing use of summary, composite measures of health that combine the mortality and morbidity effects of diseases into a single indicator; the availability of results of Global Burden of Disease (GBD) studies, which make use of such summary indicators; and developments in the measurement of disability and risk factors. The more traditional approaches to measuring health are widely available in other public health textbooks and will be used for illustrative and comparative purposes here.

This chapter is divided into five sections. The first section explains the reasons for and approaches to measuring disease burden in populations, describes the need for using quantitative indicators, highlights the importance of using data for decision making in health, and lists a variety of major health indicators currently in widespread use. The second section critically reviews methods for developing and using composite measures that combine the mortality and morbidity from diseases in populations at national and regional levels. It explores the potential utility of these measures and discusses their limitations

and implications. The third section demonstrates the application of these methods for measurement of health status and assessment of global health trends. It reviews current estimates and forecasts trends in selected countries and regions, as well as examines the global burden of disease. The fourth section reviews important underlying risk factors of disease and discusses recent efforts to measure the prevalence of major risk factors and to determine their contributions to regional and global disease burdens. The final section provides conclusions for the chapter.

Reasons for and Approaches to Measuring Health and Disease

Rationale

The many reasons for obtaining health-related information all hinge on the need for data to guide efforts toward reducing the consequences of disease and enhancing the benefits of good health. These include the need to identify which interventions will have the greatest beneficial effect, to identify emerging trends and anticipate future needs, to assist in determining priorities for expenditures, to provide information for education to the public, and to help in setting health research agendas. The primary information requirement is for understanding and assessing the health status of a population and its changes over time. In recent years, practitioners have emphasized the importance of making evidence-based decisions in health care. There is little reason to doubt that evidence is better than intuition, but realizing its full benefits depends upon recognizing and acting upon the evidence. This chapter examines evidence—the facts of health and disease—and demonstrates how to assemble this evidence so that it can assist in better decision making concerning health and welfare.

A well-documented example of the relationship between decision making and data can be seen in a classic health systems project in Tanzania (**EXHIBIT 1-1**). This

EXHIBIT 1-1 Using Evidence to Improve a Health System: An Example from Africa

The **Tanzania Essential Health Interventions Project** (TEHIP), a joint venture of the Tanzanian Health Ministry, the International Development Research Centre (IDRC), and the Canadian International Development Agency, starting in 1996 was conducted in two rural districts—Morogoro and Rufiji—with a combined population of approximately 700,000. The annual health spending in Tanzania was about $8 per capita. In Morogoro and Rufiji, TEHIP added resources on the condition that they be spent rationally; in other words, the amount of money spent on interventions should reflect the burden of disease. TEHIP conducted burden of disease analysis for the two districts and established a demographic surveillance system (DSS). The routine data from the DSS provided information for the district teams to support resource allocation based on disease burden. The organization found that the amount that the local health authorities spent on addressing each disease bore little relation to the actual burden of disease. Although childhood problems (e.g., pneumonia, diarrhea, malnutrition, measles) constituted 28% of the disease burden, only 13% of the budget was devoted to addressing them. Other conditions, meanwhile, attracted more than their fair share of resources. For example, 22% of the budget was targeted to tuberculosis, even though it accounted for less than 4% of years of life lost.

TEHIP promoted the use of burden of disease analysis, district accounts, and other mapping tools for more rational decision making in the districts. It also brought management tools and community voice techniques to the district teams. The result was better ability of district-level healthcare workers and managers to control and allocate resources and processes related to healthcare provision. The district teams decided to spend more on neglected diseases for which cost-effective treatments or preventive measures were available. The extra $1 per capita was enough to allow the district health authorities to align their spending to reflect the real disease burden. For example, sexually transmitted diseases received 3% of the budget prior to TEHIP's intervention; that percentage changed to 9.5% after the realignment. Malaria accounted for 30% of the years of life lost because of death and debilitating illness; the budget for malaria prevention and treatment programs increased from 5% of total spending in 1996 to 25% in 1998.

The results of TEHIP were documented as changes in health outcomes. In Rufiji, for example, infant mortality fell by 40% in 5 years. In fact, just between 1999 and 2000, infant mortality fell from 100 deaths per 1,000 live births to 72 deaths per 1,000 live births, while the proportion of children dying before their fifth birthdays dropped by 14%, from 140 per 1,000 to 120 per 1,000. The success of TEHIP and its approach led to replication and further innovation in not only Tanzania but also many other low- and middle-income countries (LMICs), including Burkina Faso, Ghana, and Nigeria.

For additional information on the TEHIP success story, visit the websites identified in the following sources.

Data from https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/7814.pdf; https://www.idrc.ca/en/article/tanzanias-healthcare-breakthrough; https://www.researchgate.net/publication/268341357_Tanzania_Essential_Health_Interventions_Project_An_Overview_of_TEHIP_Interventions_Tanzania_Ministry_Of_Health_TANZANIA_ESSENTIAL_HEALTH_INTERVENTIONS_PROJECT_TEHIP_Interventions_-An_Overview

case illustrates how able people with good intentions had been making decisions routinely, only to find that using established methods to collect evidence on the burden of disease changed the nature and effectiveness of their own decisions. A major reason for the effective use of the evidence was that it was collected locally and put forward in a form helpful to decision makers.

Measuring Health and Disease

The relative importance (burden) of different diseases in a population depends on their frequency (incidence or prevalence), severity (the mortality and extent of serious morbidity), consequences (health, social, economic), and the specific people affected (gender, age, social and economic position).

Counting Disease

The first task in measuring disease in a population is to count its occurrence. Counting disease frequency can be done in several ways, and it is important to understand what these different methods of counting actually mean. The most useful way depends on the nature of the disease and the purpose for which it is being counted. There are three commonly used measures of disease occurrence: cumulative incidence, incidence density, and prevalence.

Cumulative incidence, or *incidence proportion*, is the number or proportion of new cases of disease that occur in a population at risk for developing the disease during a specified period of time. For this measure to have meaning, three components are necessary: a definition of the onset of the event, a defined population, and a particular period of time. The critical point is *new cases* of disease—the disease must develop in a person who did not have the disease previously. The numerator is the number of new cases of disease (the event), and the denominator is the number of people at risk for developing the disease. Everyone included in the denominator must have the potential to become part of the group that is counted in the numerator. For example, to calculate the incidence of prostate cancer, the denominator must include only men, because women are not at risk for prostate cancer. The third component is the period of time. Any time unit can be used as long as all those counted in the denominator are followed for a period comparable with those who are counted as new cases in the numerator. The most commonly used time denominator is one year.

Incidence density, which is often simply called *incidence rate*, is the occurrence of new cases of disease per unit of person-time. This metric directly incorporates time into the denominator and is generally the most useful measure of disease frequency; it is often expressed as new events per person-year or per 1,000 person-years. Incidence is a measure of events (in this case, the transition from a nondiseased state to a diseased state) and can be considered a measure of risk. This risk can be looked at in any population group, defined by age, sex, place, time, sociodemographic characteristics, occupation, or exposure to a toxin or any other suspected causal factor.

Prevalence is a measure of present status rather than of newly occurring disease. It measures the proportion of people who have the defined disease at a specific point of time. Thus, it is a composite measure made up of two factors—the incidence of the disease that has occurred in the past and its continuation to the present or to some specified point in time. That is, prevalence equals the incidence rate of the disease multiplied by the average duration of the disease. For most chronic diseases, prevalence rates are more commonly available than are incidence rates.

Severity of Disease

To understand the burden of disease in a population, it is important to consider not only the frequency of the disease but also its severity, as indicated by the morbidity and premature mortality that it causes. *Premature mortality* is defined as death before the expected age of death had the disease not occurred. *Morbidity* is a statement of the extent of disability that a person suffers as a consequence of the disease over time and can be measured by a number of indicators, as discussed later in this chapter.

Mortality

Traditionally, mortality has been the most important indicator of the health status of a population. John Grant developed the first known systematic collection of data on mortality with the *Bills of Mortality* in the early 1600s in London. He described the age pattern of deaths, categorized them by cause as understood at the time, and demonstrated variations from place to place and from year to year. Mortality rates according to age, sex, place, and cause continue to be central information about a population's health status and a crucial input for understanding and measuring the burden of disease. Considerable literature exists on the use of mortality to indicate health status and its application to national and subnational levels (Murray & Chen, 1992).

The fact of death by age, sex, and place is required by law in most countries through death registration, and in many countries the cause of death through death

certification is required as well. Both provide essential information about the health status of a population. Nevertheless, in many low-income countries, the fact of death, let alone its cause, is still not reliably available.

In high-income countries, vital statistics (i.e., the registration of births and deaths by age, sex, and place) are routinely collected and highly reliable. In most middle-income countries, the reliability and completeness of these data have been steadily improving and often are fairly satisfactory. In contrast, the collection of vital statistics remains grossly incomplete in many low-income countries. An analysis of death registration in the course of the Global Burden of Disease study showed that vital registration data together with sample registration systems still do not cover 100% of global mortality. Survey data and indirect demographic techniques are needed to provide information on levels of child and adult mortality to paint a complete picture of global mortality (GBD 2015 Mortality and Causes of Death Collaborators, 2016). Nevertheless, even in low-income countries, increasing use of survey methods is delivering useful estimates of the mortality rates for the population younger than age 5 years and other populations.

Obtaining information about cause of death remains difficult even in many middle-income countries; a lot of information depends on special surveys or studies of select populations. Verbal autopsies (VAs) have been used increasingly for judging the likely cause of death, especially for children younger than age 5. This method comprises structured questions administered by trained interviewers with family members after a death; the information is then reviewed by physicians (or computers) to assign a cause of death using algorithms. VAs are useful for assessing some causes of death such as neonatal tetanus and severe diarrhea, but their sensitivity and specificity may be limited for diseases whose symptoms are variable and nonspecific, such as malaria (Anker et al., 1999; Thatte, Kalter, Baqui, Williams, & Darmstadt, 2009). Recently, automated systems for analyzing VA data have been developed and are being tested.

Age-specific mortality profiles are a prerequisite for a burden of disease analysis. Although extensive work has been done to document and analyze child mortality in low- and middle-income countries (LMICs), less has been done for adult mortality (Hill, 2003). LMICs have higher rates of age-specific adult mortality than do high-income nations (GBD 2015 Mortality and Causes of Death Collaborators, 2016; Lopez et al., 2002; Murray & Chen, 1992). Indeed, mortality rates are higher for both women and men in LMICs at every age when compared with the high-income world. In Africa, the enormous increase in deaths of young and middle-aged women and men from acquired immunoeficiency syndrome (AIDS) has had a profound impact on mortality and survival (**EXHIBIT 1-2**).

Traditional indicators of mortality have been the standard for assessing population health status. Neonatal mortality rates (NMR; deaths of live-born infants before 28 days of age per 1,000 live births), infant mortality rates (IMR; deaths of live-born infants before 12 months of age per 1,000 live births), and child mortality (deaths of children younger than 5 years of age) are considered sensitive indicators of the overall health of nations. The United Nations Children's Fund (UNICEF) publishes an annual global report that includes a ranking of nations based on these indicators (UNICEF, 2015). These indicators have the added advantage of having been studied for their relationships with other indicators of the social and economic development of nations. For example, a clear relation exists between the gross national product (GNP) per capita, which is an indicator of national wealth, and child mortality. In general, the higher the level of economic development, the lower the rate of child mortality. However, there are exceptions, and they need to be examined carefully. For example, Sri Lanka and the Indian state of Kerala are both low-income regions that have traditionally had low child mortality rates. These examples demonstrate that the relationship between mortality and poverty is complex and needs in-depth investigation.

There are major deficiencies in cause-specific mortality data in low- and most middle- income countries. In keeping with demographic and epidemiologic transitions, the pattern of cause-specific mortality changes at different levels of total mortality, with a general trend of decreasing infectious and parasitic disease cause-specific mortality with declining total mortality. Indeed, mortality from these communicable causes has been a major reason for the historical difference between high- and low-mortality populations (Murray & Chen, 1992).

The cause of death certification system based on WHO's *International Classification of Diseases* (ICD) has been used widely in many countries for many years (WHO, 2016). Despite the existence of this standardized process for categorizing deaths, variations in the reliability of these data occur because of variations in the training and expertise of the people who are coding causes of death, as well as the supervision and feedback provided. Nevertheless, there have been steady improvements in many countries, including automation of data collection and analysis, and these kinds of data provide some of the best information available on major causes of mortality.

EXHIBIT 1-2 Trends of the HIV/AIDS Epidemic

Globally, AIDS is the leading infectious cause of death among 15- to 49-year-olds (Global Burden of Disease Risk Factors Collaborators et al., 2015). Untreated disease caused by the human immunodeficiency virus (HIV) has a case fatality rate that approaches 100% (WHO, 2003). Unknown more than 30 years ago, the HIV/AIDS epidemic has killed more than 35 million people.

At the end of 2016, an estimated 36.7 million people were living with HIV/AIDS, with 69.5% of those individuals living in sub-Saharan Africa (WHO, 2017) . The prevalence of new HIV infections has increased by 60% in eastern Europe and Central Asia (**TABLE 1-1**) (UNAIDS, 2017; WHO, 2017).

HIV/AIDS is the tenth leading cause of disability-adjusted life years, accounting for 2.7% of this global burden. In terms of mortality, it is the eleventh leading cause of death among people of all ages, accounting for 2.1% of all deaths (Global Burden of Disease Risk Factors Collaborators et al., 2015). Nearly 42% of the 1 million global deaths from HIV/AIDS have occurred in East and Southern Africa (**FIGURE 1-1**) (UNAIDS, 2017).

TABLE 1-1 Global Summary of HIV and AIDS Epidemic

Number of people living with HIV	**Total**	**36.7 million**	**(30.8–42.9 million)**
	Adults	34.5 million	(28.8.4–40.2 million)
	Women	17.8 million	(15.4–20.3 million)
	Children	2.1 million	(1.7–2.6 million)
Number newly infected with HIV	**Total**	**1.8 million**	**(1.6–2.1 million)**
	Adults	1.7 million	(1.4–1.9 million)
	Children	160,000	(100,000–220,000)
AIDS deaths	**Total**	**1.0 million**	**(830,000–1.2 million)**
	Adults	890,000	(740,000– 1.1 million)
	Children	120,000	(79,000–160,000)

Reproduced from Joint United Nations programme on HIV/AIDS (UNAIDS). (2017). *UNAIDS Data 2017*. Geneva, Switzerland: Author. Retrieved from http://www.unaids.org/sites/default/files/media_asset/20170720_Data_book_2017_en.pdf

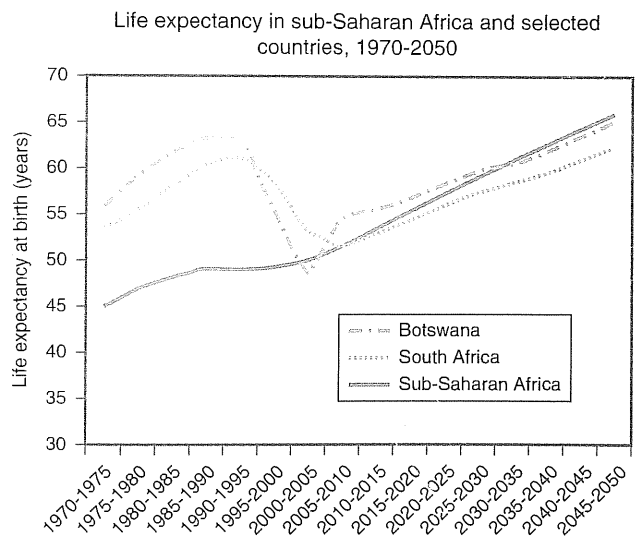


FIGURE 1-1 Trends in life expectancies and the HIV/AIDS epidemic.

Courtesy of Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat. (2008). *World population prospects: The 2008 revision*. Retrieved from www.un.org/esa/population/publications/wpp2008/wpp2008_highlights.pdf

Reproduced from Joint United Nations programme on HIV/AIDS (UNAIDS). (2017). *UNAIDS Data 2017*. Geneva, Switzerland: Author. Retrieved from http://www.unaids.org/sites/default/files/media_asset/20170720_Data_book_2017_en.pdf; World Health Organization (WHO). (2017). *Global health observatory (GHO) data – HIV/AIDS*. Geneva, Switzerland: Author. Retrieved from http://www.who.int/gho/hiv/en/

Mortality can be expressed in two important quantitative measures: (1) *mortality rate* (MR) and (2) *case fatality ratio* (CFR). The MR, a form of incidence rate, is expressed as the number of deaths in a defined population in a defined time period. The numerator can be total deaths, age- or sex-specific deaths, or cause-specific deaths; the denominator is the number of persons at risk of dying in the stated category as defined earlier for incidence. Demographers use the notation XqY for the probability of dying in the Y years following age X at the then prevailing age-specific mortality rates for the population. Thus, 5q0 is the probability of death of newborns by age 5 years (see Table 1-2 later in this chapter), and 30q15 is the probability of death in young adults from age 15 to 45. The CFR is the proportion of those persons with a given disease who die of that disease (at any time, unless specified). The MR is equal to the CFR multiplied by the incidence rate of the disease in the population.

The distinction between the proportion of deaths attributable to a cause (number of deaths due to the cause divided by total number of deaths in a given population in a given time period) as compared to the probability of death from the cause (disease-specific MR) is important to understand. For example, the probability of death (and disability) from noncommunicable causes (indeed, from virtually all causes) is higher in low- and middle-income regions than in the high-income world. However, the proportion of deaths and disability attributable to these chronic causes is smaller in LMICs than in wealthier countries because of the much larger toll taken by infectious and nutritional causes. With increasing economic development, the risk of death and disability from chronic disease does not increase; rather, the proportion of deaths attributable to chronic disease increases as the proportion of deaths attributable to communicable and nutritional disease declines.

Demographic and Epidemiologic Transitions

The demographic transition describes the changes in birth and death rates that historically have accompanied the shift from a traditional society to a modern society; it is detailed in other chapters. With modernization, sharp declines in mortality have been followed by a reduction in fertility, albeit one that commonly lags behind the change in the death rate by years or decades. The term *transition* refers to the shift away from a stable population in which very high birth rates are balanced by very high death rates to a stable population in which low birth rates are balanced with low death rates. In between these extremes, as a society undergoes modernization, there is a lag between falling mortality, especially in the under-5 age group, and the drop in birth rates that leads to explosive population growth. Thereafter birth rates fall and a new stage is reached in which birth and death rates are low and balance resumes. The result is a striking change in the age structure of the population, with a decreased proportion of children and an aging population. These changes in the population age distributions are reflected in the shift from a wide-based pyramid, reflecting larger numbers in the younger age groups, to a structure with a narrow base, nearly rectangular configuration, and nearly equal percentages in each age group.

In 1971, Omran described the underlying reasons for the demographic transition and used the term *epidemiologic transition* to explain the changing causal factors of disease that accounted for the dramatic drop in under-5 mortality, which was largely due to reduction in malnutrition and communicable diseases. Although high rates of maternal mortality are characteristic of the low- and middle-income world, reductions in maternal mortality occur in a different time frame from those in under-5 mortality. Reductions in maternal mortality require a better-developed infrastructure, including ready availability of surgical and blood transfusion capacity plus improved communication and transportation systems. Thus, drops in maternal mortality occur much further along the road toward economic development, and changes occur only after shifts in the child mortality have been seen.

Major changes in the patterns and causes of injury are also likely to occur with modernization. For example, road traffic injuries tend to increase as countries go through the stage of development in which there is a great increase in vehicles and in the speeds at which they are operated before improved roads, appropriate laws and regulations, and law enforcement are in place (Crooper & Kopits, 2003; WHO, 2015). There may also be important shifts in the nature of violence and the people toward whom it is directed, related to crime patterns, civil unrest, ethnic conflicts, and intrafamily tensions (WHO, 2002b). The profound impact of the HIV/AIDS epidemic was discussed earlier in Exhibit 1-2.

Other Health-Related Metrics

In addition to basic measures of mortality, morbidity, and life expectation that are central for population health status assessment, a variety of important health-related indicators are useful for specific purposes. Many are discussed more fully in other chapters of this text; they are summarized in **TABLE 1-2**. Those related to the Sustainable Development Goals (SDGs) are discussed in **EXHIBIT 1-3**.

TABLE 1-2 Health-Related Metrics

Type	Indicator	Definition/Interpretation
Demographic indicators: reproductive health	Maternal death	Death of a woman while pregnant or up to 42 days post-delivery from any cause except accident
	Maternal mortality ratio	Maternal deaths per number of pregnancies (maternal deaths per 100,000 live births)
	Maternal mortality rate	Maternal deaths per number of women of reproductive age (maternal deaths per 100,000 women aged 15–49)
	Lifetime risk of maternal mortality	Cumulative loss of human life due to maternal death over the female life course
	Total fertility rate	Average number of children a woman would bear if she lived to the end of her reproductive period
	Life expectation at birth	Average number of years a newborn would live if his or her life were lived under the mortality conditions for the place and year in question
Anthropometric indicators: nutrition	Weight for age	Underweight
	Height for age	Stunting
	Weight for height	Wasting
	Mid-upper arm circumference	Wasting
Mortality (death) indicators	Mortality rate	Number of deaths in a specified time period/number of persons at risk of dying during that period
	Infant mortality rate	Number of deaths of live born infants before 12 months of age per 1,000 live births
	Under-5 mortality rate	Number of deaths of children younger than age 5 per 1,000 live births averaged over the last 5 years
	5q0	Probability of death of a newborn by age 5
	Neonatal mortality rate	Number of deaths of live-born infants before 28 days of age per 1,000 live births
	Stillbirth rate	Number of babies born with no signs of life at or after 28 weeks' gestation per 1,000 births
	Perinatal mortality rate	Number of fetal deaths (28 or more weeks of gestation) + postnatal deaths (first week) per 1,000 live births
Disease frequency	Endemic	Usual occurrence of a given disease in a defined population
	Epidemic	Occurrence of a given disease in a defined population clearly in excess relative to its usual occurrence
	Pandemic	A worldwide epidemic involving large numbers

EXHIBIT 1-3 Sustainable Development Goals

On September 25, 2015, UN member states adopted 17 *Sustainable Development Goals* (SDGs) as part of the post–Millennium Development Goals (MDGs) development agenda. The SDGs build on the goals identified under MDGs and broaden the scope to include new areas of focus—for example, climate change, economic inequality, innovation, sustainable consumption, and peace and justice—to improve overall well-being and life of current and future generations through sustainable means.

The 17 SDGs were divided into 169 quantifiable targets that are measured by 230 indicators. Of these, 21 targets and 39 indicators are directly related to health. The health-related indicators include a variety of indicator types: incidence rates, prevalence "rates," mortality rates, mortality ratios, birth rates, and proportion of target populations receiving an intervention.

Appendix 1 provides examples of some of the health-related SDG indicators.

Morbidity and Disability

Measures of mortality have been the principal indicators of population health status for generations. Their relative ease of observation, availability of data, and history of use make mortality information useful for assessing and monitoring the health status of populations. However, the key limitation with mortality-based indicators is that they "note the dead and ignore the living" (Kaplan & Anderson, 1996). Measurements of morbidity, by comparison, are more problematic because there is not a clearly defined endpoint such as death provides. In addition, several components of disability need to be assessed, and there may be a substantial subjective aspect to grading the extent or severity of a condition.

The *International Classification of Impairments, Disabilities, and Handicaps* (ICIDH) was developed in the 1970s to classify nonfatal health outcomes as an extension of WHO's ICD system (WHO, 1980). It was developed to more fully describe the impact of a given disease on an individual and on society, and to account for that disease's heterogeneity of clinical expression and evolution in different individuals and societies. ICIDH categories included *impairment* (loss or abnormality of psychological, physiological, or anatomic structure or function), *disability* (restriction or lack of ability to perform an activity considered normal), and *handicap* (disadvantage from a disability or impairment for a given individual based on the inability to fulfill a normal role as defined by age, sex, or sociocultural factors). These distinctions clarified more than just processes—they helped define the contribution of medical services, rehabilitation facilities, and social welfare to the reduction of disability.

In 2002, WHO built on the ICIDH to develop the *International Classification of Functioning, Disability, and Health*, commonly known as ICF (WHO, 2002c). In this system, health-related domains are classified from the perspectives of the body, of the individual, and of society by means of two lists: a list of body functions and structures, and a list of domains of activity and participation. Because an individual's functioning and disability occur within a context, the ICF also includes a list of environmental factors that provide a description of that context. The ICF has become WHO's framework for measuring health and disability at both individual and population levels. It was officially endorsed by all 191 WHO member states in the Fifty-Fourth World Health Assembly on May 22, 2001 (resolution WHA 54.21). Unlike its predecessor, which was endorsed for field trial purposes only, the ICF was endorsed for use in member states as the international standard to describe and measure health and disability.

Using such classifications, indicators of disability—such as *impairment-free*, *disability-free*, and *handicap-free* life expectancies—have been developed. These, in turn, have been used to estimate health-adjusted life expectancies using severity and preference weights for time spent in states of less than perfect health.

Hospital inpatient discharge records—when they are based on good clinical evidence and coded by staff well trained in coding procedures—can provide high-quality data on the major causes of morbidity serious enough to require hospitalization. They also can provide good cause-of-death data for hospitalized persons, and some sense of the outcome status of those with serious conditions. Hospital data are generally improving in quality, especially in middle-income countries and in selected sentinel (usually tertiary care) teaching hospitals in low-income countries. Such information is inevitably biased because of the highly skewed distribution of those using such hospitals, but in many situations it is possible to have a good understanding of those biases and make appropriate adjustments to draw useful conclusions.

Generally, outpatient records in most of the world are highly deficient in terms of diagnosis; indeed,

they often identify only the patient's chief complaint and the treatment dispensed. The main value of most such records is limited to establishing the fact of using a facility. There are usually strong biases in terms of those patients who use outpatient facilities because of access factors (distance and cost of use), nature and severity of the disease problem, and opportunity for using alternative services.

Visits to healthcare facilities, functional disability (a measure of activity that is less than the norm), and time spent away from work (absenteeism, work days lost) have all been used to assess the magnitude of morbidity from various conditions. A commonly used approach to evaluating morbidity in a population has been the assessment of the impact on social roles or functional performance, such as days missed from work or spent in bed (Kaplan & Anderson, 1996). A considerable body of literature focuses on the wide variety of instruments used to measure such functional capacity, especially in the clinical medical literature, that are not directly useful for population-based morbidity assessment.

Data about morbidity are often based on self-perceived assessments, and are frequently gleaned from survey-based interview information. The perception of morbidity and its reporting, the observation of morbidity and its impact, and other factors are responsible for the wide variations between reported and measured prevalence of conditions (Murray & Chen, 1992). This has resulted in an underestimation of the presence and impact of morbidity in both LMICs as compared with high-income nations. This situation also underscores the variations in morbidity data, which are often interpreted as indicating that wealthy individuals and low-mortality populations report higher rates of morbidity (*Global Burden of Disease and Risk Factors*, 2006; Woolf et al., 2015).

Measurement of health-related quality of life has also been discussed in the medical literature for decades. *Health-related quality of life* refers to how well an individual functions in daily life and his or her perception of well-being. Various domains of quality have been defined, such as health perception, functional status, and opportunity, and several instruments have been developed to evaluate them. Both disease-specific and general instruments exist, with such tools abounding in fields dealing with patients having chronic disabled states, such as psychiatry, neurology, and counseling. These scales are often dependent on self-reported information, although some incorporate observational data as well. However, concerns have been raised about their reliability and validity. These measures are not discussed further in this text, because they have been primarily used in clinical assessments of individuals, rather than larger populations.

Measuring Disability

If all the various forms of disability—physical, functional, mental, and social—are to be compared with mortality, they must be measured in an equivalent manner for use in health assessments. To do so, measurement of disability must quantify the duration and severity (extent) of this complex phenomenon. A defined process is needed that rates the severity of disability as compared with mortality, measures the duration of time spent in a disabled state, and converts various forms of disability into a common scale. General measures of disability without regard to cause (often carried out by special household surveys) are useful to determine the proportion of the population that is "disabled" and unable to carry out normal activities, but are not much help for quantifying the extent of disability.

In general, three components of disability need to be assessed. The first component is the *case disability ratio* (CDR)—the proportion of those diagnosed with the disease who have disability. For most diseases that are diagnosed clinically, the CDR will be 1.00 because, by the definition of disease given earlier, patients will have signs or symptoms. In contrast, when the diagnosis is based on, for example, infection rather than disease (such as tuberculosis) or on a genetic marker rather than the physical manifestation (such as sickle cell trait), the CDR is likely to be less than 1.00.

The second component of disability is its *extent or severity*—how incapacitated the person is as a result of the disease. The extent of disability is expressed on a scale, such as from 0 (indicating no disability) to 1.00 (equivalent to death). The assessment of severity can be quite subjective, particularly because so many different types and dimensions of disability exist. A number of methods have been introduced in an effort to achieve comparability and obtain consistency (Murray, Salomon, Mathers, & Lopez, 2002).

Measurement of individual preferences for different health states to determine relative severity of disability has been done by a variety of methods (Kaplan & Anderson, 1996; Murray et al., 2002; Torrance, 1986). Factors that influence the assessment of such preferences include the type of respondent, the type of instrument used to measure the response, and the time from entry into the disabled state. Individuals who are in a particular state, healthy individuals, healthcare providers, caretakers, and family members have all

been interviewed in studies. Adaptation, conditioning, development of special skills, and vocational training can all change the response of individuals over time within a particular health state, thereby affecting the value of that state to the individual. As a consequence, the valuation is time dependent—for example, the value placed on a year of life by a paraplegic soon after entering that health state would be different from that obtained after several years of adjustment to that state (Murray & Lopez, 1994).

Instruments used to extract such preferences involve visual and interview techniques (*Global Burden of Disease and Risk Factors*, 2006; Torrance, 1986). Two alternative scenarios are often presented to the subject and the point of indifference sought (as in standard gamble techniques). Despite much work in this area, there is no consensus or accepted standard method for such elicitation. Severity of disability scales have been developed by group consensus using community surveys (Kaplan & Anderson, 1996), a mixture of community and expert groups (Ghana Health Assessment Team, 1981), experts only (World Bank, 1993), and population surveys (Global Burden of Disease Risk Factors Collaborators et al., 2015; Murray et al., 2002; Salomon et al., 2012). These scales usually compare perfect health states to death on a scale of 0 to 1 (**TABLE 1-3**).

In the first Global Burden of Disease 1990 study, the disability severity estimates were based on expert opinion. Twenty-two indicator conditions were selected and used to construct seven disability classes (Table 1-3). Outcomes from all other health conditions were categorized within these seven classes (with special categories

TABLE 1-3 Examples of Disability Classification Systems

Ghana Health Assessment Team, 1981

Class	Severity	Equivalent to (Maximum)
1	0	Normal health
2	0.01–0.25	Loss of one limb's function
3	0.26–0.50	Loss of two limbs' function
4	0.51–0.75	Loss of three limbs' function
5	0.76–0.99	Loss of four limbs' function
6	1	Equivalent to death

Global Burden of Disease Study, 2013*

Category	Disability Weight for Unique Health States
Infectious disease	Acute episode, mild: 0.006 (0.002–0.012) Acute episode, moderate: 0.051 (0.032–0.074) Diarrhea, mild: 0.074 (0.049–0.104) Ear pain: 0.013 (0.007–0.024)
Cancer	Diagnosis and primary treatment: 0.288 (0.193–0.399) Metastatic: 0.451 (0.307–0.600)
Cardiovascular and circulatory disease	Acute myocardial infarction (MI), days 1–2: 0.432 (0.288–0.579) Acute MI, days 3–28: 0.074 (0.049–0.105) Heart failure, mild: 0.041 (0.026–0.062)
Diabetes and digestive and genitourinary disease	Diabetic foot: 0.020 (0.010–0.034) Gastric bleeding: 0.325 (0.209–0.462) Infertility, primary: 0.008 (0.003–0.015)

Chronic respiratory disease	Asthma, controlled: 0.015 (0.007–0.026) Chronic obstructive pulmonary disease (COPD) and other chronic respiratory diseases, mild: 0.019 (0.011–0.033) COPD and other chronic respiratory diseases, severe: 0.408 (0.273–0.556)
Neurologic disorders	Dementia, mild: 0.069 (0.046–0.099) Multiple sclerosis, moderate: 0.463 (0.313–0.613) Parkinson's disease, severe: 0.575 (0.396–0.730)
Mental, behavioral, and substance use disorders	Alcohol use disorder, very mild: 0.123 (0.082–0.177) Anxiety disorders, moderate: 0.133 (0.091–0.186) Anorexia nervosa: 0.224 (0.150–0.312)
Hearing and vision loss	Hearing loss, mild: 0.010 (0.004–0.019) Hearing loss, profound, with ringing: 0.277 (0.182–0.387) Distance vision, severe impairment: 0.184 (0.125–0.258)
Musculoskeletal disorders	Low back pain, moderate: 0.054 (0.035–0.079) Neck pain, severe: 0.229 (0.153–0.317) Gout, acute: 0.295 (0.196–0.409)
Injury	Burns, lower airway, with or without treatment: 0.376 (0.240–0.524) Crush injury, short or long term, with or without treatment: 0.132 (0.089–0.189) Concussion: 0.110 (0.074–0.158)
Other	Abdominopelvic problem, mild: 0.011 (0.005–0.021) Anemia, moderate: 0.052 (0.034–0.076) Hypothyroidism: 0.019 (0.010–0.032)

* Health states included in this table are only examples. The full list of 235 unique health states and their disability weights are available in Salomon et al., 2015.
Data from Salomon, J. A., Haagsma, J. A., Davis, A., de Noordhout, C. M., Polinder, S., Havelaar, A. H., et al. (2015). Disability weights for the Global Burden of Disease 2013 study. *Lancet Global Health, 3*(11), e712-723. doi: 10.1016/S2214-109X(15)00069-8

for treated and untreated groups). This approach was revised for the 2010 iteration of the study, for which the process included empirical studies comprising simple paired questions, and survey of the general public through household surveys in countries such as Bangladesh, Indonesia, Peru, Tanzania, and the United States, as well as a web-based survey in English, Spanish, and Mandarin. The result was a categorization that included 220 health states (Salomon et al., 2012). Generally, for most conditions a reasonable degree of consensus can be reached within broad categories (e.g., 25% disabled as compared with 50%), but efforts to reach much finer distinctions have proved equivocal. The need to seek out more refined scales for purposes of health program decision making ought to be a national or local decision.

The third component of disability is its *duration*. The duration is generally counted from onset of the disability until cure, recovery, or death. Sometimes there is continuing permanent disability after the acute phase is completed; in such a scenario, the duration would be the remaining life expectation from the time of onset of disease.

Data for Decisions

In the collection and assessment of information, the level of precision required should be guided by the purpose for collecting the information and depend on the decisions to be taken. Even rough estimates may be helpful; though disconcerting to some, the time and cost of efforts to realize further precision need to be justified by the increased precision's potential impact on decision making. LMICs, with their scarce resources, need timely and appropriate information to plan and implement health interventions that maximize the health of their populations. Methods, indicators, and assessments of disease must support and contribute to this primary purpose of health systems.

Decisions concerning deployment of interventions against diseases and underlying risk factors ideally should be taken such that maximum healthy life per resource expenditure is obtained in an equitable, fair, and just fashion. The ultimate reason for obtaining health data is to have the information to guide such decision making.

Summary Measures of Population Health

This section focuses on the major approaches used for developing composite measures of population health status that summarize mortality and morbidity occurring in a population through the use of a single number. It discusses the rationale for composite measures, reviews the origins of each major approach, examines methodological differences among these approaches, and outlines the advantages and limitations of each.

Rationale for Composite Measures

Rationing of healthcare resources is a fact of life everywhere; choices about the best use of funds for health must inevitably be made (Hyder, Rotllant, & Morrow, 1998; WHO, 2000). The global scarcity of resources for health care is a challenge for every country, rich and poor (Evans, Hall, & Warford, 1981; Figgis & Walters, 2015–2017; World Bank, 1993), but the realities in LMICs paint the choices in much starker terms. It is even more important for LMICs to choose carefully how to optimize health expenditures so as to obtain the most health in the most equitable fashion from these expenditures. Important tools under development to assist in making better choices for health spending are based on measures of the effectiveness of health interventions in improving health status in relation to their cost.

In most sectors, decisions on resource allocation are based on perceived value for money. The health sector, however, has had no coherent basis for determining the comparative value of different health outcomes (from different health programs). To make decisions about whether to put money into programs that reduce mortality in children, as compared with those programs that reduce disabling conditions in adults, a common denominator is needed. In recent decades, work has been carried out to develop composite indicators combining morbidity and mortality into a single measure that may serve as a common denominator for comparing different health outcomes. A common unit of measure for these different health outcomes is *time lost from healthy life*.

The most important reason for attempting to capture the complex mix of incommensurable consequences resulting from disease within a single number is the need to weigh the benefits of health interventions against their costs. Costs of health programs are expressed in a unidimensional measure, such as U.S. dollars; therefore, the benefits to be achieved from their expenditure should be expressed in the same manner. *Healthy lifetime* is a unidimensional measure that can be used to compress health benefits and losses into a single time dimension. An explicit, objective, quantitative approach should enable better budgetary decisions and permit resource allocation in the health sector to be undertaken in a more effective and equitable fashion.

Note that a composite indicator is simply a tool to be used to assist decision makers in resource allocation. Like any tool, it can be misused. Conclusions that are reached on the basis of these indicators must be carefully examined. Not only do problems arise in trying to put so many dimensions together, which inevitably may lead to distortions, but serious issues also emerge concerning the reliability and validity of the information on which these indicators are based. Thus, all the problems associated with determining causes of death, counting the number of cases of disease, and assessing the extent of disability from a condition will lead to uncertainties when these factors are added and multiplied together. The development of a single indicator consisting of a specific number implies deceptive stability about something that may actually be composed of fragile data. Continuing vigilance in how these data are obtained, compiled, and used is critical, and those responsible for using the tool must have a clear technical understanding of what lies behind the numbers and which underlying assumptions and limitations are associated with these approaches. Despite all of these caveats, alternative approaches to improved decision making leave even more to be desired.

Uses of Composite Indicators

Measures of health status that combine mortality and morbidity facilitate comparisons both within and across populations. They can be used to estimate the quantitative health benefits from interventions and serve as tools to assist in the allocation of resources. The development of such measures entails two major processes: the measurement of healthy life, including losses of time from premature mortality and disability; and the valuing of life, which incorporates issues of duration, age, extent of future life, productivity, dependency, and equity (Morrow & Bryant, 1995). The purpose of developing such measures and the need for refining them become clear if the following objectives are to be achieved:

- The use of such methods at the country level for evaluating the impact of diseases
- Their use in the allocation of resources within the health sector
- The generation of more relevant and useful data for policy makers

Understanding Summary Measures

Precursors of composite indicators have been discussed in the literature for decades and generally were developed to assist with prioritization of health issues. Usually these metrics were based on the measurement of losses of time, losses of productive time, income forgone, or other costs incurred as a result of diseases. The earlier indicators generally focused on economic losses and estimated time loss due to disease and converted these losses into a dollar value. Thus, these measures are more economic measures than disease burden measures.

Two types of composite summary measures have been developed: *health gap measures* (healthy life lost), such as healthy life years (HeaLYs) or disability-adjusted life years (DALYs), and *health expectancies*, such as disability-free life expectancy (DFLE) or health-adjusted life expectancy (HALE). Both types use healthy lifetime lost through disability and death as a common measure of the impact of mortality and nonfatal health outcomes. These two types of measures are complementary and can be studied using survivorship curves, as discussed by Murray and Lopez (1994) (**FIGURE 1-2**).

In Figure 1-2 (Murray et al., 2002), the darker line is the survivorship curve based on a standard hypothetical life table population that demonstrates the proportion (y-axis) of an initial birth cohort that remains alive at any age (x-axis). The area A + B is the total life expectancy at birth of this cohort. A part of this life is spent in full health (area A); the lighter line is the survivor curve of those persons in full health. Thus, area A represents time lived in full health, whereas area B is time lived in suboptimal health (with disability). Area C represents time lost due to mortality. The area of the complete rectangle (A + B + C) represents the ideal survivorship curve—the theoretical maximum of healthy life for a cohort who lived in full health until a maximum age when all died.

Health expectancies are summary measures that estimate expectancy of life in a defined state of health. Examples include DFLE, active life expectancy, and HALE. These indicators extend the concept of life expectancy to expectations of various states of health, not just of life per se. Health expectancies assign lower weights to life lived in less than full health on a scale of 0 to 1, in which full health is rated 1. In Figure 1-2, health expectancy is given by the following equation:

$$\text{Health expectancy} = A + f(B)$$

where f is some function that assigns weights to years lived in suboptimal health.

Health gaps are summary measures that estimate the difference between actual population health and some specified norm or goal. In Figure 1-2, that difference is indicated by area C (loss due to mortality) plus some function of area B—that is, survivorship with disability:

$$\text{Health gap (healthy life lost)} = C + g(B)$$

where g is some function that assigns weights to health states lived during time B. Weights range between 0, meaning no disability (full health), and 1, meaning complete disability (equivalent to death). Note that this measure is equivalent to healthy life lost based on the natural history of disease in a population as discussed in the section "Healthy Life Year" later in this chapter.

Although some believe that health expectancies such as the HALE indicator are more readily understood (because they are conceptual extensions of the

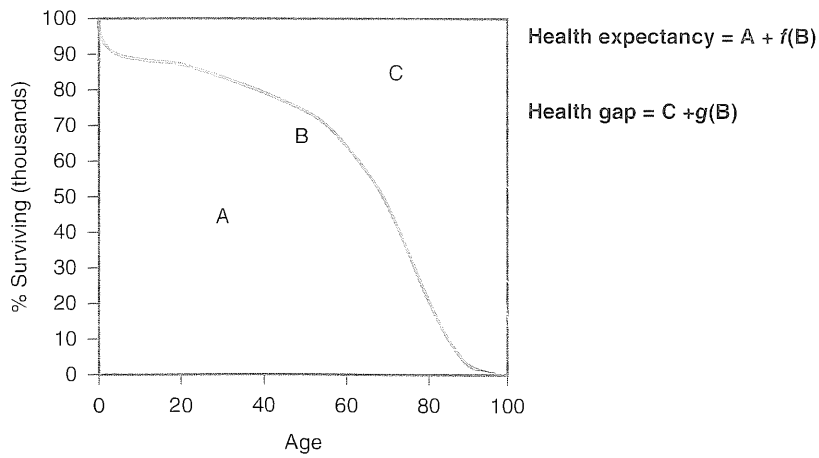


FIGURE 1-2 Survivorship curve of a hypothetical population showing health gaps and health expectancies.

Modified from Murray, C. J. L., et al. (2002). *Summary measures of population health*. Geneva, Switzerland: World Health Organization.

widely used life expectancy measure), health gap measures have important advantages for the purposes of health policy, planning, and resource allocation decisions. Both HeaLYs and DALYs are developed on the basis of disability and death attributable to a specific disease in an individual person. In their construction, great care is taken to ensure that there is *categorical attribution* using the ICD, so that each event (death or disability) is mutually exclusive and collectively exhaustive. With these measures, therefore, summing deaths and disabilities from each disease provides the total amount of death and disability for the population (a property termed *additive decomposition*). Health gap measures have this property, whereas health expectancies do not (Murray et al., 2002).

Composite Indicators

A number of composite summary indicators for burden of disease assessment have been developed. We will focus on four of these indicators: three of the health gap type (the healthy life year, the disability-adjusted life year, and the quality-adjusted life year) and one of the health expectancy type (HALE). In addition to measures of morbidity and mortality per se, these composite indicators may incorporate certain social value choices either explicitly or implicitly: the choice of life expectancy tables, valuing future life as compared with present life, valuing life lived at different ages, valuing social or economic productivity, and valuing equity in relation to cost-effectiveness. These social value choices are discussed later in this chapter (see the section "Valuing Life: Social Value Issues"), but because some social value choices are integral to the calculations of some composite indicators, they are briefly mentioned in this section.

Healthy Life Year

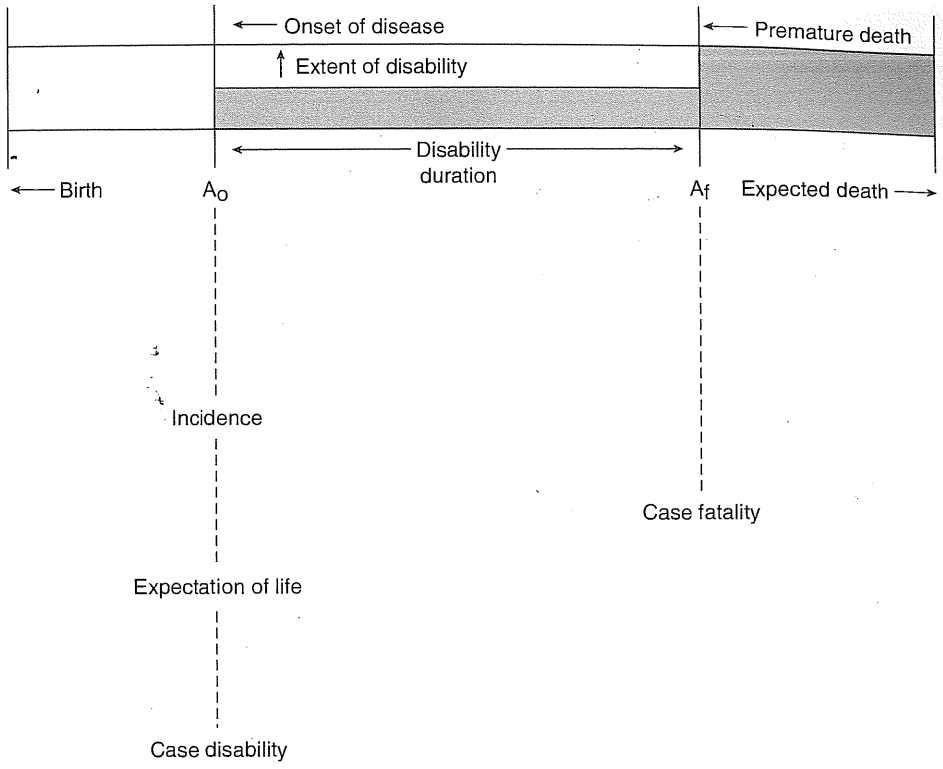
The healthy life year (HeaLY) is a composite measure that combines the amount of healthy life lost due to morbidity with that lost due to death—that is, loss of life expected had the disease not occurred (Hyder et al., 1998). We discuss the HeaLY first because it is conceptually straightforward, serves as a prototype for other health gap indicators, and was the first of the composite measures to be used as a tool in national health planning (Ghana Health Assessment Team, 1981).

Measuring the loss of healthy life from disability is more challenging than measuring the comparable loss from death, and many approaches have been used (Murray & Lopez, 1994). To incorporate loss from disability in a composite measure, such a loss must have comparable dimensions to that for life lost due to death. The HeaLY includes three components for disability: case disability ratio (comparable to the case fatality ratio), extent of disability, and duration of disability. The CDR and duration of disability can be determined objectively, but assessment of the extent of disability, which usually ranges from 0 (no disability) to 1 (equivalent to death), has a substantial subjective element (Morrow & Bryant, 1995).

The healthy life approach focuses on knowledge of the pathogenesis and natural history of disease (Last, Spasoff, & Harris, 2000) as the conceptual framework for assessing morbidity and mortality and for interpreting the effects of various interventions (**FIGURE 1-3**).

The onset of disease usually will be dated from the start of symptoms or signs, as determined by the individual afflicted, a family member, or a medical practitioner, or as the result of a lab test. Several different patterns of disease evolution are possible, of course. **FIGURE 1-4** illustrates healthy life lost from disability and premature death due to typical cases of cirrhosis, polio, and multiple sclerosis, respectively, in terms of onset, extent and duration of disability, and termination. The conclusion of the disease process depends on the natural history of the disease as modified by possible interventions. The possible outcomes include clinical recovery (the complete disappearance of clinical signs and symptoms), progression to another disease state (such as chronic hepatitis progressing to cirrhosis), and death. The last outcome includes death directly caused by the disease as well as death indirectly brought on by the disease as a result of disability.

The definitions of variables and formulas to calculate HeaLYs are provided later in this section and summarized in **TABLE 1-4**. Each disease will have a distribution of ages at which onset or death may occur, but for most diseases the average age will provide a satisfactory approximation for a population. In view of the limitations of data, this is the starting assumption for the application of the HeaLY method in LMICs. Nevertheless, as with other choices in this method, if sensitivity testing indicates that the average age is not satisfactory, then estimates may be based on age distributions. Similarly, if the natural history of a disease or response to interventions is different in different age groups, then the disease can be specifically classified by age (e.g., neonatal tetanus as compared with adult tetanus, and childhood pneumonia as compared with adult pneumonia). In recurrent diseases or diseases with multiple episodes (e.g., diarrhea), age at onset denotes the average age at first episode.



Note: A_o = average age at onset; A_f = average age at death; ▨ = healthy life lost.

FIGURE 1-3 The HeaLY model: Loss of healthy life from disability and death.

The expectation of life in HeaLYs were based on normative expectations of what should occur under usual circumstances at the time of that work. Women in Japan, who had the highest global expectation of life, approximated this norm with an expectation of life at birth of 82.5 years for females (Model Life Table West, level 26) (Coale, Demeny, & Vaughan, 1983; Coale & Guo, 1989).

The definition of disease ("dis-ease") makes the value of the case disability ratio 1 by default for most disease states, because all cases are disabled (to varying degrees and duration) if those persons have been labeled as diseased. For some conditions (e.g., sickle cell trait or HIV positivity) and risk factors, however, cases may not be considered diseased by definition, but the condition nonetheless needs to be assessed.

The duration of disability can be either temporary or permanent (lifelong). If the disability is temporary, then Dt is the duration of that disability until recovery (see Table 1-4). If the disability is permanent and the disease does not affect life expectation, then Dt is the expectation of life at age of onset of disease [Dt = E(Ao)]. If the disability is permanent and the disease reduces life expectation, then Dt is the expectation of life at age of onset reduced by the difference between ages of fatality and onset [Dt = E(Ao) – (Af – Ao)]. A disability severity scale needs to be used to estimate extent (severity) of the disability (see Table 1-4).

The HeaLYs lost from death and from disability are added and expressed as the total years of life lost per 1,000 population per year. The loss is attributed to the year in which disease onset occurs and includes the stream of life lost from disability and death at any time after onset, even if these events happen many years later. This method offers a prospective view of the event (disease onset) and its natural history (or as modified by interventions) over time.

An important benefit of the HeaLY formulation is that the effects of different kinds of interventions can be readily explored to determine their expected gains in terms of healthy life. The HeaLY spreadsheet (available upon request from the authors) incorporates these concerns; it also includes options for considering the proportion of the population that will be covered by an intervention and allows for different levels of coverage for different segments of the population for each intervention.

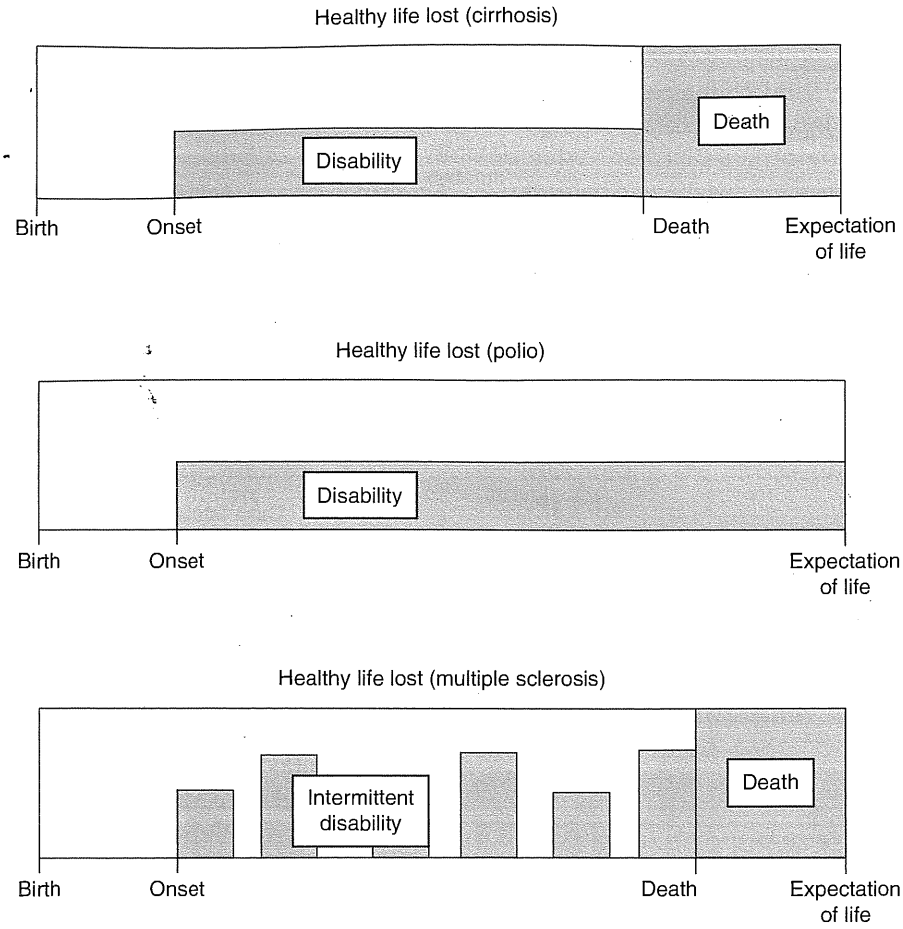


FIGURE 1-4 Different patterns of healthy life lost.

Reproduced from Hyder A., Rollant G., and Morrow R. H. (1998). Measuring the burden of disease: Healthy life-years. *American Jaurnal of Public Health, 88*(2), 196–202. Figure 1, p. 197.

Disability-Adjusted Life Year

The disability-adjusted life year (DALY) is a health gap population summary measure that combines time lost due to disability with that lost due to death (life that would have been expected had the disease not occurred), in a manner similar to the HeaLY measure. It first appeared in the World Development Report of 1993 and has become the most widely used composite measure of population health (Global Burden of Disease Risk Factors Collaborators, 2016; Global Burden of Disease Risk Factors Collaborators et al., 2015; Jamison et al., 2006; Lim et al., 2012; Lopez et al., 2002; Murray & Lopez, 1994; Murray et al., 2002).

DALYs are calculated as two separate components for the measurement of life lost due to disease, and they may also directly include three social value choices. The two components are (1) years of life lost (YLL), referring to the loss of healthy life from death, and (2) years of life lived with disability (YLD), referring to the loss of healthy life from disability. Thus

$$\text{DALY} = \text{YLL} + \text{YLD}$$

The social value choices that may be included in DALYs are (1) life expectation values, (2) discount rates for future life, and (3) weighting for life lived at different ages, as discussed later.

Since the GBD 2010 study (Lozano et al., 2012), age weighting is no longer a default value choice for the DALY. Instead, users have the option to calculate these values with or without age weighting, as well as with or without discounting. The following three options could be applied: (1) use both age weights and discounting, (2) use either age weights or discounting, and (3) use neither age weights nor discounting.

The calculation for YLL in a population uses the age distribution of all deaths by cause in one year multiplied by life expectation at each age to estimate the loss of life for each disease that would have been expected if not for that disease. The expectation of life can be obtained either from a model life table (Coale & Guo, 1989) or based on the best achievable low levels of mortality such as those found in Japan; thus the DALY, as does the HeaLY, directly incorporates this social value choice.

TABLE 1-4 Variables for Estimating Healthy Life Years (HeaLYs)

Symbol	Explanation	Expression
I	Incidence rate per 1,000 population per year	/1,000/year
Ao	Average age at onset	years
Af	Average age at death	years
E(Ao)	Expectation of life at age of onset	years
E(Af)	Expectation of life at age of death	years
CFR	Case fatality ratio: proportion of those developing the disease who die from the disease	0.00–1.00
CDR	Case disability ratio: proportion of those developing the disease who have disability from the disease	0.00–1.00
De	Extent of disability (from none to complete disability equivalent to death)	0.00–1.00
Dt	Duration of disability in years Disability can be either permanent or temporary: ▪ If temporary, then Dt = duration of that disability (i.e., until recovery or death) ▪ If permanent and disease does not affect life expectation, then Dt = E(Ao) ▪ If permanent and the disease does reduce life expectation, then Dt = Af − Ao	years
HeaLY	Healthy life years lost per 1,000 population per year: $I \times \{[CFR \times \{E(Ao) - [Af - Ao]\}] + [CDR \times De \times Dt]\}$	HeaLYs per 1,000 per year

For disability, the DALY uses estimates of incidence, duration, and severity to calculate the time lived with disability (YLD) for each disease. The YLD component equals the number of incident cases in the period multiplied by the average duration of disease multiplied by a weight factor for the degree of severity (extent) of the disease. A description of the severity scale used in one version of DALY was given earlier in this chapter, in the section on measurement of disability (see Table 1-4).

The second social value choice, which was directly incorporated in the original version of DALY, is the discount rate of 3% per annum. This social time preference has been used for most estimates; recently, DALY results discounted at 0% have also become available.

The third social value choice concerns weighting life lived at different ages. Earlier DALYs were age weighted according to an arbitrary exponential curve designed to give the most value to life lived as a young adult (Hyder et al., 1998; World Bank, 1993). Weighting by age was the most controversial component of the DALYs when they appeared and caused great dissent from other health professionals (see the section "Valuing Life Lived at Different Ages" later in this chapter). Recent DALY listings from GBD studies also include results with no age weighting (all years equally valued). It has been argued that age weighting

of DALYs does not affect final results, but this depends on the purpose for making the estimates and has been challenged (Anand & Hanson, 1997; Barendregt, Bonneux, & Van der Maas, 1996; Barker & Green 1996; Hyder et al., 1998).

An important difference between the HeaLY and the DALY is the fact that the starting point for the HeaLY is the onset of disease; that is, the loss of healthy life is based on the natural history of the disease (as modified by interventions), illustrated in Figures 1-2 and 1-3. This is true for the YLD component of the DALY, but the YLL is based on mortality in the current year. In a steady state, there is no difference in these perspectives. However, when incidence is changing—such as with HIV in many parts of the globe—the DALY approach can potentially understate the true situation (Hyder & Morrow, 1999).

The calculation for DALYs can be expressed in the form of an integral that was first published in the World Bank literature (Murray & Lopez, 1994). This single equation incorporating all technical and value choices had the advantage of standardization to ensure comparability of the multiple calculations undertaken in the GBD studies, and greatly facilitated the actual computations. Nevertheless, for national and local priority setting, it may be preferable to use an indicator constructed such that the social value choices can be adjusted to suit national and local preferences (Bobadilla, 1998; Hyder et al., 1998; Morrow & Bryant, 1995). Recent DALY formulations allow for this possibility; indeed, it is useful to think of DALYs as a family of related measures using terminology specifying the following formulation: DALY (r, K) uses a discount rate of r and age weighting indexed to K. Other parameters can be added in a similar fashion (Jamison et al., 2006).

HeaLYs and DALYs are both "health gap" measures and can be considered part of the same family of measures. In fact, DALYS exactly equal HeaLYs when the following conditions are met: (1) the condition in question is in steady state or equilibrium (that is, the incidence, CFR, and disability variables remain constant during the time intervals under consideration); (2) age weighting is not applied ($K = 0$); and (3) the same measures of disability (weights) are used.

Quality-Adjusted Life Year

The quality-adjusted life year (QALY) was introduced in 1976 to provide a guiding principle for selecting among alternative tertiary healthcare interventions (Zeckhauser & Shepard, 1976). The idea was to develop a single measure of quality of life that would enable investigators to compare expected outcomes from different interventions—a measure that valued possible health states both for their quality of life and for their duration.

The central notion behind the QALY is that a year of life spent in one health state may be preferred to a year spent in another health state. This generic measure sums time spent in different health states using weights on a scale of 0.00 (dead) to 1.00 (perfectly healthy) for each health state; it is the arithmetic product of duration of life and a measure of quality of life (health state weight). For example, 5 years of perfect health = 5 QALYs; 2 years in a state measured as 0.5 of perfect health followed by 5 years of perfect health = 6 QALYs.

The QALY was originally developed as a differentiating indicator for individual choices among tertiary healthcare procedures, not as a measure of disease burden in a population. It was used to assess individual preferences for different health outcomes from alternative interventions (Morrow & Bryant, 1995). The QALY, too, comprises a large family of measures. Since its introduction, a wide variety of QALY measures have been developed, along with a voluminous literature on alternative methods incorporating a range of disability domains and a diversity of methods to assign weights to generate QALYs (Kaplan & Anderson, 1996; Nord, 1993). The most widely used measure is the EQ-5D (European Quality of Life with Five Domains and three levels of quality for each domain; www.euroqol.org).

Perhaps the most important use of QALYs has been as a common denominator to measure utility in cost-utility analysis (and effectiveness in cost-effectiveness analysis) to assist in resource allocation among alternative health interventions by ranking interventions in terms of cost per QALY (Kaplan & Anderson, 1996; Nord, 1992; Torrance, 1986). An early and widely publicized attempt to make the best use of healthcare resources by maximizing QALYs per dollar expended was the well-intentioned but rather unfortunate effort undertaken in Oregon in the early 1990s (**EXHIBIT 1-4**).

In the United Kingdom, as part of its 1997 National Health Service (NHS) reforms, the National Institute for Clinical Excellence (NICE; www.nice.org.uk) was created to advise public health officials about the effectiveness and cost-effectiveness of various health interventions. In an explicit attempt to introduce economic considerations in addition to medical judgments for the allocation of resources, NICE has produced a large collection of studies on the cost per QALY produced by the interventions it appraises. Some of these appraisals have been the source of considerable controversy. If a treatment is considered cost-effective for a group of patients,

EXHIBIT 1-4 Oregon: Historical Application of the QALY for Allocation of Resources

An early and well-known attempt to apply the QALY approach for allocation of health resources occurred in the state of Oregon (Blumstein, 1997). In 1988, Oregon faced a budgetary shortfall for its Medicaid program, and coverage for organ transplants was denied. In an effort to prioritize its health services, Oregon undertook a bold attempt to explicitly ration health services. A coalition including consumers, healthcare providers, insurers, business, and labor representatives launched a broad and courageous healthcare reform. It began with a series of "experiments" in which the decision-making process was based on a cost-effectiveness approach using quality of well-being (QWB—essentially a QALY) for comparing the outcomes of treatment options among people.

The initial list, published in 1990, consisted of 1600 condition/treatment pairs drawn up as follows:

Cost-effectiveness ratio = cost of services / (health gain × duration)
Cost of services = charges for treatment including all services and drugs
Quality of well-being (QWB) = sum of QWB weight (W) × each QWB state × probability that symptoms of that QWB state would occur
Health gain = QWB with treatment − QWB without treatment

From the beginning, there was great opposition to the very notion of rationing; consequent denial of services to those who had conditions that did not make the list contributed to the rancor. There were also unfortunate technical blunders in the generation of the first list. For example, treatment for thumb sucking was ranked higher than hospitalization for starvation, and treatment for crooked teeth higher than early treatment for Hodgkin's disease. Such inconsistencies, together with objections raised by groups advocating for the disabled, gave rise to alternative approaches for establishing rankings.

Although enormous public effort went into the reform and much was accomplished, the explicit cost-effectiveness approach with QALYs as the outcome measure was eventually dropped (Blumstein, 1997; Eddy, 1991; Morrow & Bryant, 1995; Nord, 1993).

NICE will recommend its use throughout the NHS; if not, it will recommend against its use in the NHS. The use of these cost-effectiveness studies as an aid to decision making is intended to increase the total healthcare benefits gained from the money spent by the NHS.

The QALY as originally used is essentially equivalent to the YLD of the DALY; in fact, it would be exactly the same as the YLD when the following conditions are met: (1) there is no discounting ($r = 0$); (2) there is no age weighting ($K = 0$); and (3) the same disability weights are used. More recently (as used in some cost-effectiveness studies), QALYs have incorporated life expectation as well.

Health-Adjusted Life Expectancies

Several types of health expectancies exist in the literature. During the 1990s, *disability-free life expectancy* (DFLE) and related measures were calculated for many countries (Robine, 1994; Mathers et al., 2001). However, these measures incorporate a dichotomous weighting scheme in which time spent in any health state categorized as disabled is assigned, arbitrarily, a weight of zero (equivalent to death). Thus, DFLE is not sensitive to differences in the severity distribution of disability in populations. In contrast, *disability-adjusted life expectancy* (DALE) adds up expectation of life for different health states with adjustment for severity weights. In 2001, WHO replaced the DALE terminology with *health-adjusted life expectancy* (HALE); the latter term will be used throughout the remainder of this text.

The HALE is a composite summary measure of population health status that belongs to the family of health expectancies; it summarizes the expected number of years to be lived in what might be termed the equivalent of "full health." WHO has used it as the measure of the average level of health of the populations of member states for annual reporting on population health for a few years (WHO, 2000).

Health expectancy indices combine the mortality experience of a population with the disability experience. The HALE is calculated using the prevalence of disability at each age so as to divide the years of life expected at each age (according to a life table cohort) into years with and without disability. Mortality is captured by using a life table method, while the disability component is expressed by additions of prevalence of various disabilities within the life table. This indicator allows an assessment of the proportion of life spent in disabled states. When compared with the total expectation of life, it translates into a measure of the total disability burden in a population.

Comparison of the various methods and specific indicators is available in the literature (Robine, 1994). Alternative methods are given in WHO's *National Burden of Disease Studies* manual (Mathers et al., 2001a). As originally designed, the HALE does not relate to

TABLE 1-5 Comparisons of Original Versions of Composite Summary Measures of Population Health

	Quality-Adjusted Life Years	Healthy Life Years	Disability-Adjusted Life Years	Health-Adjusted Life Expectancy
Origin	North America, 1976	Ghana Ministry of Health, 1981	World Bank development report, 1993	World Health Organization report, 2000
Purpose	Assess individual preferences for various outcomes from complex interventions	Assist in resource allocation decisions	Compare disease burdens in many different populations	Compare national disease burdens
Level of use	Personal decisions	National- and district-level decisions	Broad policy decisions	Global comparisons
Data	Tertiary hospital data and personal interviews	National and local data from multiple sources; expert review	Global data and expert opinion	Global data and expert opinion
Original discipline base	Economists, clinicians	Epidemiologists, clinicians, national planners	Economists, statisticians	Demographers, economists, statisticians
Social values that may be incorporated	Generally not included	Future life discounted	Age weighting (not mandatory), future life discounted	Not relevant

Reproduced from North America, 1976; Ghana Ministry of Health, 1981; World Bank Development Report, 1993; World Health Organization Report, 2000.

specific diseases, but rather to the average extent of disability among that proportion of each age group that is disabled. The lack of correlation between a condition or disease entity and the measure made it less valuable for resource allocation and cost-effectiveness calculations.

Summary

TABLE 1-5 summarizes these summary measures (original versions) in terms of origins, purposes, level of use, sources of data, and disciplinary background of originators.

Valuing Life: Social Value Issues

The very idea of valuing some lives more than others is jarring, yet these notions are regularly reflected in our actions. The value of life is often implicit in the way resource allocation decisions are made; therefore, as much as possible such decisions should be explicit, open, and transparent. Many thoughtful people have serious reservations about assigning a single number to such a complex multidimensional phenomenon as health. But what is the alternative for use as a measure of utility or effectiveness in economic analyses? Outcome measures must be expressed as a unidimensional measure to be comparable to unidimensional monetary expenditure units for costs. (However, decisions about allocation should not be made on a mechanical basis; other factors, including the effect on equity, may need to be considered in decisions in addition to the goal of maximizing healthy life per unit expenditure.)

To construct composite measures of population health, important social value choices must be made. Choices about which expectation for life should be used and about valuing life lived at different ages, valuing future life as compared with the present, valuing life in terms of economic and social productivity, and valuing equity in relation to efficiency—all raise major ethical concerns.

Expectation of Life

Years of life lost due to death and to chronic disability are based on life expected had the disease not occurred. To estimate the expectation of life in a population, a choice must be made between using a local, national, or model life table. This choice should be determined by the purpose of the study. For example, for assisting in national and local decision making, it may be more suitable to use national life tables based on the mortality and fertility of the population in question than to use model life tables. Conversely, a model life table might be selected to reflect the best health state possible in the world, as this selection may allow a fair comparison with other countries. For example, from a global perspective it would be unfair to use national life tables to compare gains that could be achieved from a particular intervention in Ghana with those in the United Kingdom, even if both costs and lives saved were the same in each country. The reason is that those lives saved in Ghana would have a lower life expectancy than those in the United Kingdom, resulting in less healthy life saved for the same expenditure. From the global viewpoint in this example, the priority would be to fund the intervention in the United Kingdom because it would produce more healthy life per expenditure than for Ghana.

Valuing Life Lived at Different Ages

Age weighting refers to the valuing of a year of life according to the age at which it is lived. This practice immediately raises questions about the basis for valuing human life. Does a day of one person's life have the same value as a day of anyone else's life? Does the value vary with age, economic productivity, or social status? Should life itself be valued separately from what is done with that life?

The Ghana Health Assessment Team (1981) judged that all human life was intrinsically valuable and that a given duration of any life was equal in value to that of any other life. The valuing of a year of life equally, irrespective of age, has been considered egalitarian (Busschbach, Hesing, & de Charro, 1993; Morrow & Bryant, 1995). This choice was incorporated into the development of the HeaLY approach: A year of life lived at any age is equally valued.

The original 1990 DALY formulation assigned an exponential function to provide a value chosen so that life lived as a dependent (e.g., infants, children, the elderly) was given less value than life lived during the productive years. With this approach, the intrinsic value of life increased from zero at birth to a maximum at age 25 and declined thereafter, so that a day of life of a 50-year-old was worth about 25% less than that of a 25-year-old. Paradoxically, the age weighting used in the original DALY formulation led to higher valuation of life lived before age 15 than did the HeaLY formulation, in which life lived at all ages has equal value (Barendregt et al., 1996; Hyder et al., 1998). Current formulations of the DALY leave age weighting as an option, and such weighting is not used with the HALE.

Age-related valuing has been justified by studies showing that individuals value their own life lived at different ages differently. Such values have been reported in the literature, and classic studies have reported that they are consistent across respondents of different ages (Busschbach et al., 1993). In addition, studies from many countries reveal a preference for saving younger lives as compared with older ones (Murray & Lopez, 1994). Nevertheless, it was not clear how much of the differential valuing of life at different ages is related to an underlying appreciation that economic and social productivity varies at different ages. If it is decided at the local or national level that healthy life should be valued according to economic and social productivity, then an alternative to age weighting might be to explicitly add a productivity factor or subtract for the societal costs of dependents, such as education (see the section "Valuing Life for Its Economic and Social Productivity").

Valuing Future Life Compared with Present Life: Discounting

Discounting is the process for determining the present value of future events. *Social time preference* takes into account the phenomenon that people value events at present more highly than those in the future (independent of inflation and of uncertainty). For investments in other sectors, time preference is normally taken into account by discounting future returns and costs by some appropriate discount rate. Thus, the discount rate can be considered the inverse of an interest rate. The main issue concerning discounting in relation to summary measures is whether discounting life itself is appropriate. There seems to be little question about the usefulness of discounting the future value of what is produced by healthy life, but should the life itself be discounted (Morrow & Bryant, 1995)?

Discounting has been applied in the health sector because both the losses from a disease and the benefits from a health intervention often occur in the future. An intervention today may not produce immediate benefits (such as in immunization), or it may result in benefits being sustained over a long time (such as in supplementary nutrition). The costs for these activities must be borne now, but the benefits are realized in the future and are less valuable than if they could

occur now. This is equivalent to investing money now so as to obtain more in the future. Thus, a HeaLY now has greater intrinsic value to an individual or community than one in the future (Gold, 1996; Weinstein, Siegel, Gold, Kamlet, & Russell, 1996).

The rate at which society is supposed to discount benefits, termed the social discount rate (SDR), is a numeric reflection of societal values regarding intertemporal allocation of current resources. There is no consensus about the most appropriate choice of a discount rate in health, but most agree that it should be lower than that used in the private commercial sector. Historically, the 1993 World Development Report and the first GBD studies used a discount rate of 3% per year (more recent iterations of the GBD studies do not use discounting in the default calculations, but instead have it as an optional parameter that can be set by the user); in lieu of other information, this rate has been adopted in many international public health cost-effectiveness studies. Nevertheless, the impact of using a range of discount rates, including zero, should be explored with each study.

Valuing Life for Its Economic and Social Productivity

Whether and how to value economic and social productivity for purposes of healthcare decision making is highly contentious; to a large extent, the age weighting incorporated in the original DALY formulation was considered by many to be a proxy for productivity. Such valuations should be considered separately, made explicit, and very much dependent on the purpose of the valuations. In general, productivity may be attributed to adults aged 15 to 64, and persons in these age groups could be given a higher value. Persons younger than age 15 and older than age 65 may be considered as dependents and given a lower value. Many variations for differential valuing are possible, including type of employment. People at different socioeconomic levels in a society are expected to have different capacities for productivity—yet, to value life according to income levels or social class would not seem fair and generally would not be acceptable. In LMICs, the value of marginal wages for subsistence agriculture is negligible, but the value of the workers' lives certainly is not.

A fundamental question is whether to consider adding a productivity component to the summary measures. Health issues do not readily conform to the requirements of market economics; information is inadequate, and misinformation is rife on the part of the providers as well as the public. Externalities from good health are generally large; demand for costly services is largely determined by the healthcare providers rather than by the consumers, and competitive market forces have not worked well for those in greatest need. In the private sector, demand for services is clearly related to productivity and willingness (and ability) to pay. However, if left to market forces alone, inequitable distribution would be inevitable.

Economic arguments have been put forward for valuing life according to productivity, but counter-claims have been made that human life cannot and should not be expressed in economic terms for decision-making purposes. Nevertheless, efforts to avoid such expression result in implicit valuation of life. More than 30 years ago, Barnum (1987) argued for adding productivity to the valuing of human life, stating that it has been ignored in health policy, is readily quantifiable, and does not ignore the welfare of children because the whole population is dependent on adult productivity for quality and sustenance. Such an economic appraisal of human life is often based on the net transfer of resources from the "producers" to the "consumers" and the consequent interdependence of people. In relation to this issue, in the *Report of the Commission on Macroeconomics and Health* (WHO, 2001), a DALY was stated to be worth at least an average annual income per head, although the basis for such a valuation was not adequately justified. More work on explicit valuations of human life and what that life produces is needed, and will certainly affect health-related cost-effectiveness decisions.

Valuing Equity in Relation to Efficiency

A child born in Malawi or Uganda will likely live only half (approximately) as long as one born in Sweden or Singapore; many babies born in Niger or Sierra Leone will not live to see their fifth birthday. These inequalities are unfair and harmful and, therefore, qualify as inequities. In terms of social justice, equity has to do with a fair distribution of benefits from social and economic development. However, the term *equity* is used in different conceptual senses: equal access to health services for all (opportunity equality), equal resources expended for each individual (supply equality), equal resources expended on each case of a particular condition (equality of resource use to meet biological need), equal healthy life gained per dollar expended (cost-effectiveness), care according to willingness to pay (economic-demand equality), care according to biological or socioeconomic need, and equal health states for all.

Decisions based on cost-effectiveness (e.g., cost per HeaLY), therefore, may not accord well with concerns about equity. These calculations are generally indifferent to equity; they are designed to steer interventions to what is efficient, whatever the differential need may be. To meet the requirements of equity,

health system planners need to go beyond ensuring equality of access to health care and require a balance so that health system responses are in accord with equity as well as efficiency.

Provided that health information is available according to socioeconomic and vulnerable groups, use of these summary indicators as tools for determining equity by calculating healthy life per dollar to be gained by all socioeconomic and vulnerable groups could readily be undertaken. It would be important to assess the impact of specific health decisions to ensure that they enhance equity. Summary measures such as HeaLYs and DALYs can be used to guide allocation of resources to ensure equitable distribution of those resources to reach those most in need. Cost-effectiveness by itself does not provide adequate guidance; equity should also be an associated criterion to govern the distribution of societal benefits.

Data for Composite Measures

Types of Data

The data needs for estimating the burden of disease in a region or country are extensive, and obtaining even reasonable estimates in LMICs has been a source of concern (Anand & Hanson, 1997; Barker & Green, 1996; Bobadilla, 1998; Murray et al., 2002). Brief descriptions of the types of data required follow. Note that any available data need to be carefully reviewed and optimally utilized.

Demographic Data. Population data are integral to burden of disease estimations and are needed both as denominators and for consistency checks. In a national setting, a recent census is useful for providing population counts by age, sex, and geographic location. Particularly helpful, when there is inadequate death registration, is to have a one-year post-census follow-up on a sample of enumeration areas to obtain robust age, sex, and place mortality. The age and sex distribution of the population is critical, and often is a major factor that determines the nature of the disease burden. A good vital registration system is a key asset that will provide both birth and death numbers. Underreporting, age misreporting, and other biases in data may have to be addressed (using standard demographic methods) prior to use of these data in burden of disease estimation.

Mortality. Mortality data are required for any burden of disease analysis. Specifically, age, sex, and place mortality rates greatly assist the analysis by defining the contribution of mortality to the pattern of disease burden. They also serve as an essential framework that constrains estimates obtained from a variety of special studies that fill important information gaps but may be incomplete or biased in the populations covered. Reporting errors, such as underreporting of deaths and failure to report age at death, need to be carefully examined. In particular, information must be evaluated for deficiencies in the under-5 group and older age groups. For the youngest ages, the probabilities of deaths in the first year (1q0) and in the next four years (4q1) provide better estimates of the risk of death than do overall mortality rates. Methods such as the Brass method for indirect estimates of mortality provide useful ways to assess age-specific mortality data for potential errors (Hill, 2001).

For burden of disease studies, cause of death data are required for all ages (except stillbirths, which are not included—a limitation of composite measures), but reliable cause of death records are often not available in LMICs, especially for deaths that do not occur in healthcare facilities. Even if available, the classification system used may be outdated and not based on the ICD, and the reliability of coding may vary by the type and location of the hospital. Young-adult deaths may be better recorded than deaths of infants and the elderly. Especially in low-income countries, it can be helpful to cross-check death records with other information, using postmortem interviews and hospital registers to assist in defining causes of death or to extrapolate from other data or other regions to assist in making estimates.

Morbidity. Meaningful data on disability are even more difficult to find and interpret than mortality data. Often morbidity information is institution-based or restricted to one or two sources, such as hospital inpatient and clinic outpatient records. The representativeness of small studies and the range and types of morbidity covered in any survey need careful evaluation. National disability surveys or regional studies conducted for the evaluation of disabled people may be available; such research is useful in providing some estimate of the prevalence of serious disabilities and their age and sex distribution. However, linkage between disability and disease is often not available, and attributing one type of disability to specific causes is difficult. For example, because many conditions can lead to blindness—for example, diabetes, hypertension, injuries, trachoma, and cataracts—the attribution of proportions of blindness in a population to its cause can be problematic. Information on the duration of disability may be found in specialized studies and the experience of institutions. The severity of disability will have to be rated on a scale; the various methods used in the literature were described earlier in this chapter.

Variables

The types of data just described need to be processed in the form of specific disease-based estimates. The key variables are defined in Table 1-4. The *incidence* rate (usually expressed per 1,000 general population per year) is central to the natural history of disease concept. Although incidence is a basic epidemiologic indicator, it is usually not found in routine data collection systems. Special studies, prospective surveys, or calculations based on the prevalence (which is more commonly available than the incidence) and knowledge of the average duration of the disease can be helpful in developing this measure.

The case fatality rate is the proportion of those developing the disease who die from it at any time. It is expressed as a decimal value between 0 (for nonfatal conditions) and 1 (for universally lethal conditions). The *case disability ratio* (analogous to the CFR) is the proportion of those diagnosed with a disease who have signs or symptoms, and is usually 1 (as discussed earlier). *Age* is required in various formats. Age at onset is when disease onset occurs in a population; age at fatality denotes the age at death as a result of the disease. The *expectation of life* at age of onset is the years of life expected at that age had the disease not occurred. Similarly, expectation of life at fatality is the years of life expected at that age had the death not occurred.

Checking Data

Data used for generation of indicators need to be evaluated for validity, reliability, and consistency, using defined qualitative and quantitative criteria. Large population-based studies may be given preference over smaller sample-based work if both are available and the quality of their data is comparable. Better conclusions may be possible by cross-checking different sources of data. Community-based studies, which may be representative of the population but have limited diagnostic validity, may be compared with hospital-based work, in which diagnosis may be valid but would come from a biased population sample. The following subsections profile simple types of checks for data quality.

Comparison of Total Numbers. Cross-checks should be done to compare total numbers. It is essential to check that the number of deaths in a year in a region is the same as the sum of all deaths from all causes in the same region. Similarly, program-based data can be compared with data from other sources to ensure better estimates of causes of death. The comparison of totals allows one to work within a frame of mortality and avoids double counting of one death. However, it does not assist in the distribution of deaths within that frame.

Relationship Between Variables. Checks based on the epidemiologic relationship between parameters refer to the application of simple, yet vital, relationships such as the following:

- Prevalence (point) = incidence × average duration of disease
- Cause-specific mortality rate = incidence × case fatality rate

These checks allow estimates from different sources to be compared for internal consistency. Such relationships can also be used to derive one of the estimates in the equations when the others are known.

Sensitivity Analysis. Sensitivity analysis is a useful tool to determine whether data that are more precise are required for the purposes of a particular decision. A one-way sensitivity analysis (Petiti, 1994) evaluates the effect of manipulating one variable at a time on the dependent variable. If the outcome is sensitive to one or more variables, their precision is more important in the estimation.

Disease Groups: Classification

Murray and Chen (1992) introduced a disease group system based on WHO's ICD classification system. Group I includes conditions characteristic of low-income countries: communicable diseases, maternal and prenatal conditions, and nutritional deficiencies. These conditions decline at rates faster than overall mortality rates as socioeconomic conditions improve; thus, group I contributes to a relatively small percentage of deaths in the high-income world. Group II, which consists of noncommunicable and chronic diseases, accounts for most loss of healthy life in high-income countries and proportionately increases with the epidemiologic transition in LMICs. Group III consists of injuries, both intentional and unintentional (including violence).

The distribution of the disease burden among these three groups is one indicator of the type of disease burden and the level of epidemiologic transition in a country. It is important to distinguish between the proportions of deaths attributed to these groups, as opposed to the risk of dying from the conditions in these groups. For example, the proportion of deaths attributable to group II causes increases from high- to low-mortality countries (or to an older age structure of the population); however, the risk of death from group II conditions is higher in high-mortality countries.

Implementing a Burden of Disease Study

Knowing how to conduct a burden of disease analysis is important for all countries. Generic steps for a national burden of disease study include the following:

- Assess demographic information, including a census with age, sex, geographic (urban/rural), and selected socioeconomic status information, and vital statistics with births and deaths.
- Collect cause-of-death information for all deaths in a year by age, sex, geographic location, and socioeconomic status as possible, according to the ICD system.
- Define disability by cause/disease, and develop a severity scale using expert and community input.
- Collate information by disease from all sources and assess these data's reliability and validity, using expert opinion when needed to define variables for a spreadsheet.
- Decide whether social value preferences such as age weighting, discounting, economic and social productivity, and expectation of life will be used and what their values will be.
- Estimate healthy life lost for each disease condition and by disease groups.
- Perform sensitivity analyses to check the robustness of results relative to critical variables and assumptions.
- Consider other variations, including assessment of losses by risk factors; regional, age, and sex breakdowns; and future projections.
- Review the policy implications for overall mortality and morbidity in the country and by cause; feed data into cost-effectiveness analysis and further research.
- Include other modifications as appropriate to the country setting.

To use summary measures to assist in health planning and resource allocation decisions, additional steps include the following:

- Estimate the effectiveness (gains of healthy life) of each intervention under consideration in terms of expected coverage and reductions in incidence and/or case fatality or case disability ratios.
- Work out the costs of the proposed interventions.
- Develop cost-effectiveness ratios to plan which combination of interventions targeted to which groups will provide a maximum return of healthy life per expenditure for the funds allocated to health.
- Review expected gains of healthy life according to age, sex, geographic area, and socioeconomic and vulnerable groups to ensure that all are better off (or at least none is worse off) and adjust as necessary.

Another very important consideration in this process is time. The conduct and analysis of such studies must be timely to assure its appropriate use by policy makers and useful for resource allocation decisions. The precision and comprehensive nature of the study must be balanced by the need for timely results.

The steps described previously may be carried out simultaneously or in some sequence, depending on the specific national situation. Modifications will likely be needed depending on the availability of data (**EXHIBIT 1-5**). An actual study requires careful planning on the part of those responsible for its conduct and may include many additional steps that are beyond the scope of this chapter. Even so, these generic steps summarize the essentials of applying the burden of disease methods to a country. Increasingly countries are obtaining, refining, and using these data on an ongoing fashion.

EXHIBIT 1-5 The Burden of Disease in United Arab Emirates, 2010

The United Arab Emirates (UAE) is one of the seven Gulf Cooperation Council (GCC) countries and consists of seven emirates: Abu Dhabi, Dubai, Sharjah, Ajman, Uum Al-Quwain, Fujairah, and Ras Al-Khaimah. An academic study was undertaken to estimate the burden of disease in UAE in 2010 and to develop a set of 2010 population estimates as well as a mortality and disability profile by age group and gender. This analysis was conducted for the UAE national and migrant populations. A burden of disease approach was used to calculate standard expected years of life lost (YLL). Data from the Global Burden of Disease 2010 study and vital registration data from the UAE's Ministry of Health were utilized for the study. Forty-five disease and injury conditions were included in the analysis. Disability estimates were calculated in terms of years of life lived with disability (YLD) using health data from the Emirate of Abu Dhabi; 150 conditions were included in the final analysis.

In 2010, the crude death rate per 1,000 population was 2.47 for UAE nationals and 1.00 for migrants. For all residents of the UAE, regardless of nationality, the leading causes of death were ischemic heart disease (14.5%), other circulatory system diseases (12.4%), motor vehicle crashes (11.3%), malignant neoplasm (6.5%), and other respiratory tract infections (5.5%). For UAE nationals, the crude death rate was estimated at 2.84 for males and 2.08 for females; for migrants, the crude death rate was estimated at 0.99 for males and 1.01 for females. Age-specific mortality rates (ASMRs) for most age groups were lower in migrant males compared to males who were UAE nationals, except for the age groups of 10–14 and 25–29 years.

(continues)

EXHIBIT 1-5 The Burden of Disease in United Arab Emirates, 2010 *(continued)*

The rates were also lower in migrant females compared to nationals, except for migrant females in the age groups of 30–39, 45–49, and 55–64 years.

A total of 291,834 YLL was lost in 2010 due to premature mortality; nationals accounted for 27% of this total and migrants for 73%. YLL lost for migrants (males: 48,514; females: 28,986) were greater than that for nationals (males: 169,864; females: 44,470), reflecting the population imbalance in the UAE wherein migrants vastly outnumber migrants. The leading causes of premature mortality for migrants were motor vehicle crashes, ischemic heart disease, and other circulatory system diseases. Drowning, falls, fires, and unintentional poisoning were some of the important causes of injuries among migrant children between 5 and 14 years of age. Occupational injuries were also an important cause of premature deaths among migrant males between 15 and 44 years.

Overall, the estimated YLD lost was 373,051; nationals accounted for 37% of YLD losses, and the losses were distributed equally among males and females. The top five conditions causing disability among nationals were low back and neck pain (26%), other musculoskeletal diseases (8.3%), injuries (7%), and diabetes (5.3%). Noncommunicable diseases and injuries were responsible for the top 20 causes of YLDs among both nationals and migrants.

FIGURE 1-5 shows the main causes of death in the UAE, and **TABLE 1-6** reviews the top conditions responsible for disease burden in the UAE.

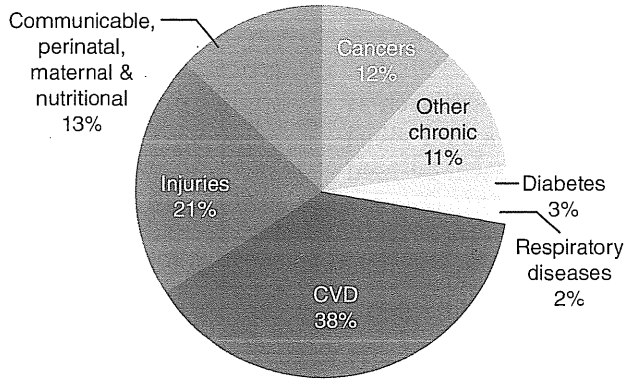


FIGURE 1-5 Deaths in the United Arab Emirates by cause, 2008.

Reprinted from World Health Organization, Noncommunicable Diseases Country Profiles 2011, page 196, Copyright 2011.

TABLE 1-6 Burden of Disease, United Arab Emirates, 2010

	Premature Mortality Only	Disability (YLD) Only	Disability-Adjusted Life Years (DALY)
Rank	Disease	Disease	Disease
1	Motor vehicle crashes	Low back and neck pain	Injuries
2	Ischemic heart disease	Other musculoskeletal disorders	Diseases of the musculoskeletal
3	Other circulatory disease	Injury requiring urgent care	Diseases of the circulatory system
4	Congenital anomalies	Fracture of sternum, rib, or bone	Diseases of the respiratory system
5	Perinatal conditions	Diabetes	Endocrine, nutritional, and metabolic diseases, and immunity disorders
6	Other respiratory tract diseases	Chronic obstructive pulmonary disease	Neoplasm
7	Other malignant neoplasm	Open wounds, superficial injuries	Congenital anomalies
8	Cerebrovascular disease	Fracture of patella, tibia, fibula	Perinatal conditions
9	Suicide	Other neurologic disorders	Diseases of the nervous system
10	Diabetes mellitus	Eczema	Diseases of the digestive system

Data from Allen, K. (2010). A national burden of disease study for the United Arab Emirates (UAE): Quantifying mortality and morbidity differentials between nationals and migrants, 2010.

Data from Allen, K. (2010). A national burden of disease study for the United Arab Emirates (UAE): Quantifying mortality and morbidity differentials between nationals and migrants, 2010.

Comparisons and Trends in Disease Burden

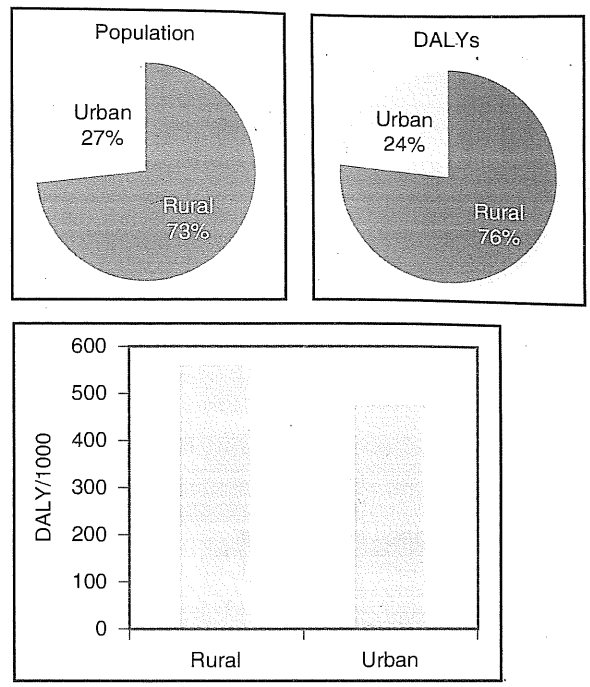
This section reviews a number of country-based and historical burden of disease studies to compare and assess trends in disease burden from place to place and over time.

National Disease Burden Assessments

Comparing the burden of disease across populations, time, and place is an important aspect of national burden of disease studies. This subsection uses examples from burden of disease studies over the past two decades to illustrate how disaggregated data can help in understanding the distribution of ill health in a country.

The Andhra Pradesh Burden of Disease Study, 2001

The regional distribution (urban/rural, state, district) of the disease burden is important to explore in a national burden of disease study. Andhra Pradesh, a state in India, was the focus of one of the most meticulous burden of disease studies, conducted between 1994 and 2001. It had a population of 76 million in 2001, 27% of whom lived in urban areas (20.8 million people); a 1:3 ratio of urban-to-rural disease burden in terms of DALYs lost was identified (Mahapatra, 2001). The burden of disease rates were 19% higher in rural areas than in urban areas, as measured by DALYs lost per 1,000 population (**FIGURE 1-6**).



Note: Total DALYs lost in Andhra Pradesh = 5 million.

FIGURE 1-6 Burden of disease in Andhra Pradesh, 2001, by region.

Data from Mahapatra, P. (2001). *Estimating national burden of disease: The burden of disease in Andhra Pradesh 1990s.* Hyderabad: Institute of Health Systems.

The Burden of Disease and Injury in New Zealand, 2013

According to the latest burden of disease estimates from New Zealand, there has been a reduction in DALYs by 1.2% per year after adjusting for population changes and age structures. The main burden of disease is due to losses from noncommunicable diseases (88%), followed by injuries (8%), and communicable diseases (4%). Approximately 52% of the DALYs are due to nonfatal outcomes. Aging of the population and longer life expectancy is an area of focus for New Zealand to develop and implement preventive and management programs. Coronary heart disease in males and back pain among females are main causes of health loss (Tobias, 2016) (**FIGURE 1-7**).

Burden of Disease Estimates for South Africa, 2000

HIV/AIDS is ravaging Africa; thus, the impact of HIV/AIDS on the burden of disease in African countries can be significant. In South Africa, 30% of the 15 million DALYs lost in 2000 were attributed to HIV/AIDS (**FIGURE 1-8**) (Bradshaw et al., 2003); for a population of 45 million, this means 0.33 DALY lost per capita. Such data are important for national decision making.

The Burden of Disease and Injury in Australia, 2003

In 2003, 2.63 million DALYs lost were attributed to the disease and injury burden in Australia, with 62% of this burden caused by noncommunicable diseases such as cancers and cardiovascular diseases and mental and neurologic disorders. Approximately 49% of the disease burden was caused by deaths from various diseases and injuries, while 51% was due to nonfatal disease and injury outcomes. The top three causes of fatal outcomes were cancers (32.0%), cardiovascular disease (29.0%), and injuries (11.0%); the leading causes of nonfatal outcomes were mental disorders (24%) and neurologic and sense disorders (19%) (Begg et al., 2007) (**FIGURE 1-9**).

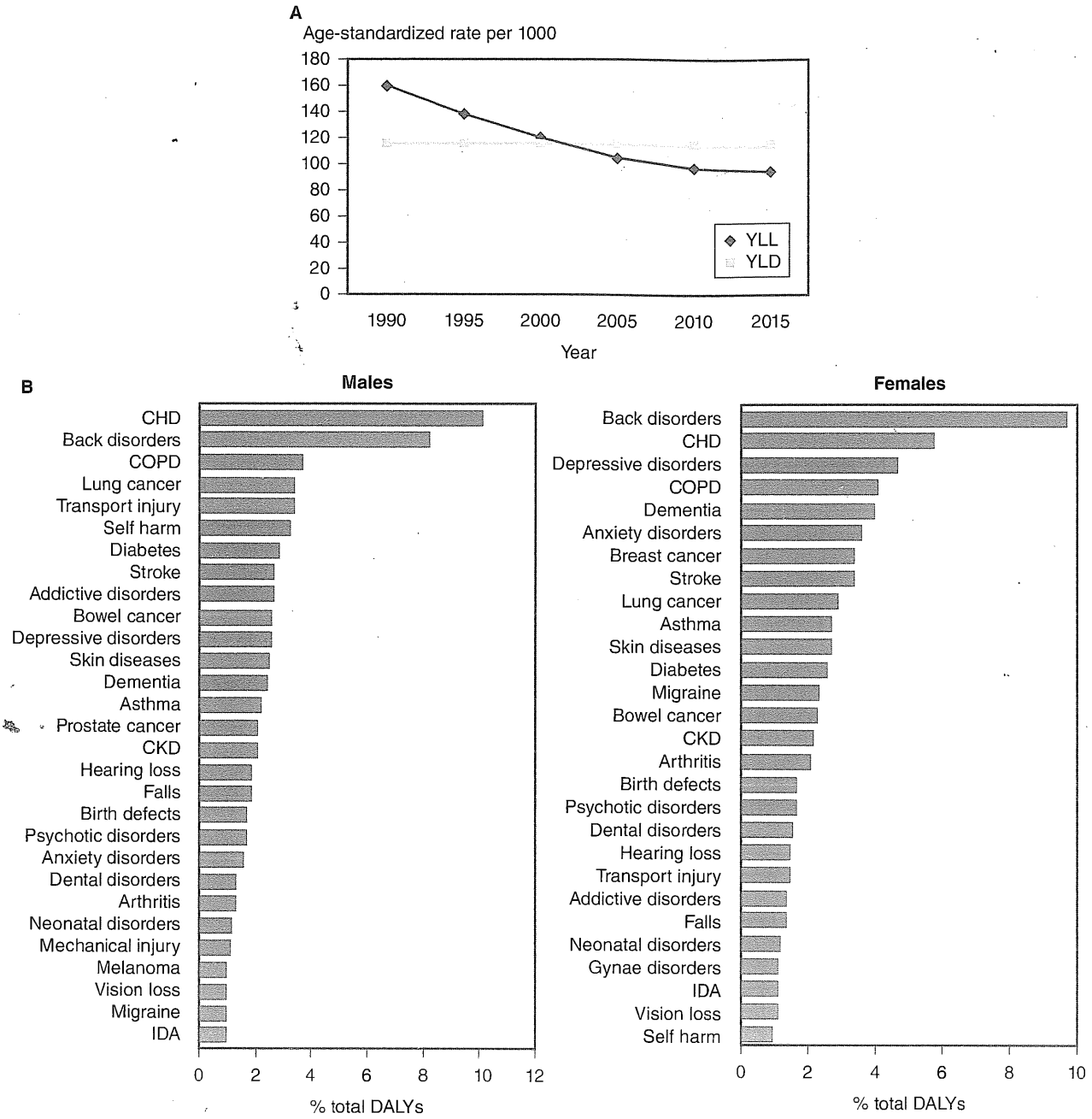
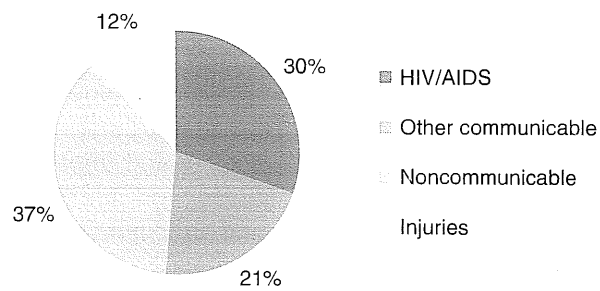


FIGURE 1-7 (a) All-cause YLL and YLD age-standardized rates per 1,000, whole population, 1990–2013, in New Zealand. (b) Contribution of leading major specific conditions to health loss (% total DALYs), by gender, 2013, in New Zealand.

(a) New Zealand Ministry of Health. (2016). *Health loss in New Zealand, 1990–2013.* (b) New Zealand Ministry of Health. (2016). *Health loss in New Zealand, 1990–2013.*



Note: Total DALYs lost in South Africa for 2000 = 15 million.

FIGURE 1-8 Burden of disease in South Africa, 2000, by disease groups.

Data from Burden of Disease Research Unit. (2003). *Initial burden of disease estimates for South Africa, 2000.* South Africa: South African Medical Research Council.

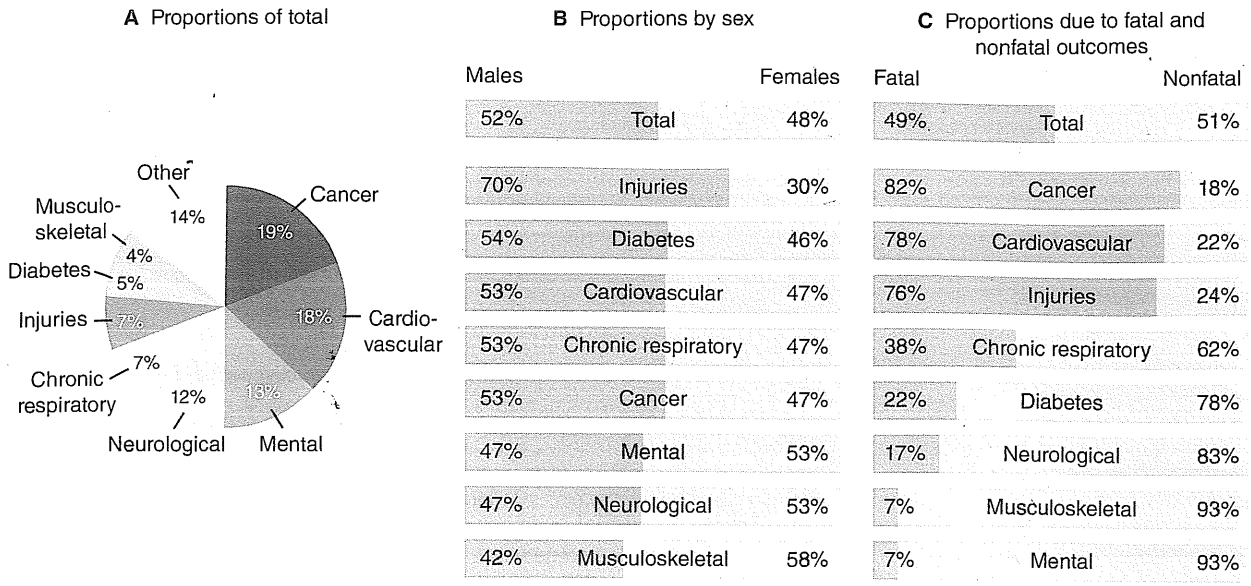


FIGURE 1-9 Burden (DALYs) by broad cause group expressed as (a) proportions of total, (b) proportions by sex, and (c) proportions due to fatal and nonfatal outcomes, Australia, 2003.

The Burden of Disease Attributable to 11 Risk Factors in Hubei Province, China, 2016

Health losses caused by 11 risk factors—namely, smoking, secondhand smoke, alcohol use, diet low in vegetables, diet low in fruits, diet high in sodium, low physical activity, high body mass index, high fasting plasma glucose, high total cholesterol, and high blood pressure—were estimated using multiple data sources in China. They included data related to population demographics, mortality, DALYs, and distribution of exposure to risk factors. Approximately 53% of all deaths were caused by these 11 risk factors, with the mortality rate being 330 per 100,000 people. The DALY rate for the 11 risk factors was 9624 per 100,000 people and accounted for 36% of all DALYs. The leading risk factor for death and DALYs was high blood pressure, which accounted for 15% of all deaths and 9% of total DALYs (**FIGURE 1-10**).

WHO Estimates of Global Burden of Disease

WHO has categorized its member states by income levels into high-, middle-, and low-income nations. The population of the world in 2015 totaled slightly more than 7.3 billion people, with 84% residing in LMICs (**FIGURE 1-11**). As may be expected, approximately 88% of the global burden is found in LMICs, reflecting the double challenge faced by the majority of people in the world: They are relatively poor and they are unhealthy. This relationship between ill health and poverty has long been recognized as complex and has been the object of much research and inquiry.

Burden of Disease by Disease Groups

Another way to disaggregate data is to explore the disease burden based on three disease groups: group I (communicable, infectious, maternal, and perinatal), group II (noncommunicable, chronic), and group III (injuries and violence). There is great variation in the portions allocated to these groups; for example, group I conditions may be responsible for anywhere from 12% to 70% of the burden of disease. When the countries are stratified by gross national income (GNI) per capita as a measure of development, an important trend can be seen from historical data (**TABLE 1-7**): As income rises, the proportion of the burden attributable to group I conditions decreases, while the share attributable to group II conditions increases. This effect is progressive, although countries such Turkmenistan (a middle-income country) still retain a high group I burden. This finding is consistent with the theory of epidemiologic transition, which predicts a change in a country's disease profile with economic development.

Global Assessments of Disease Burden

Information regarding health and disease for all countries of the world can be collated to provide a picture of global health status. In addition, global health assessments may be completed as a separate activity, and these data can then be disaggregated into regional

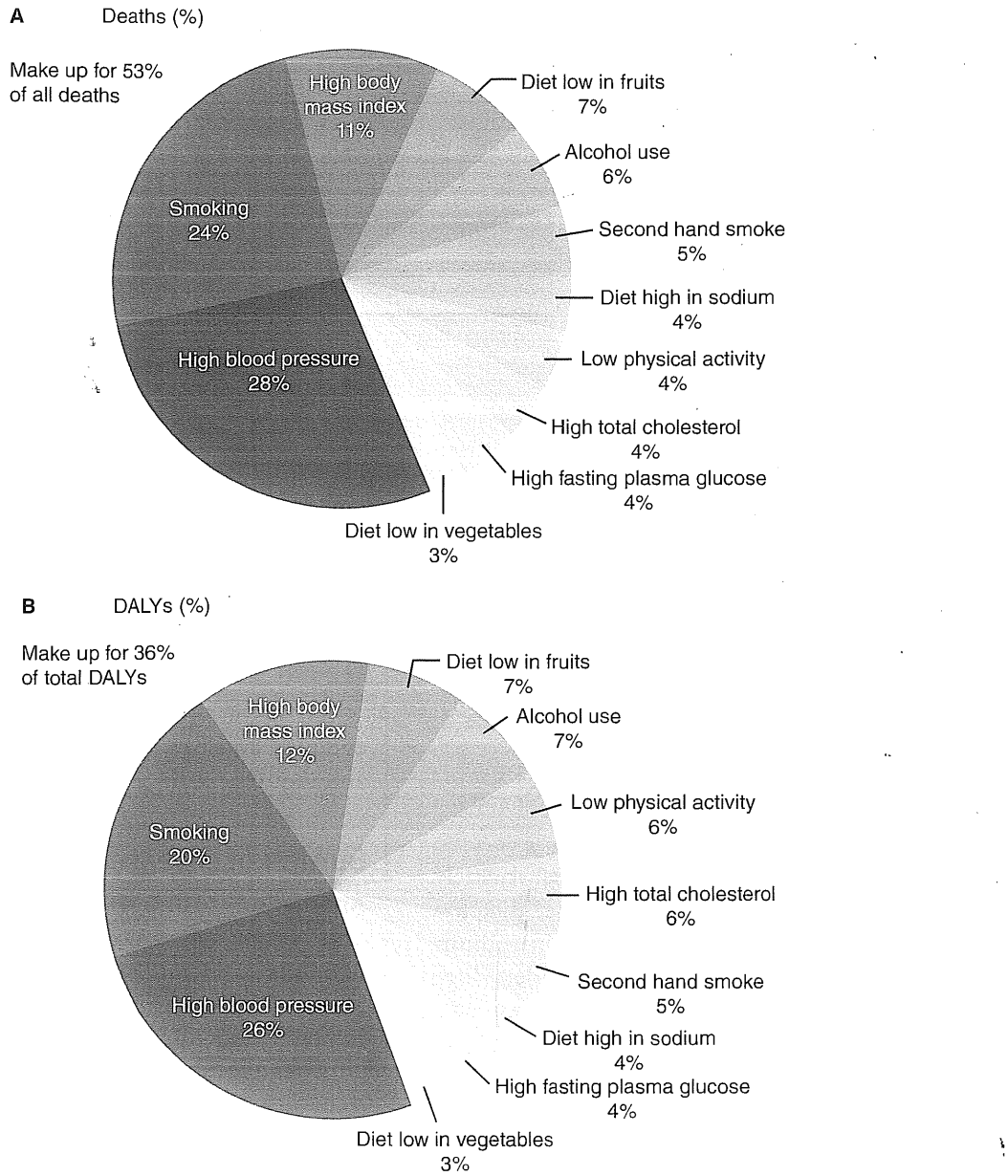


FIGURE 1-10 Burden of disease attributed to 11 risk factors in Hubei Province, China, 2013.

Data from Cui F, Zhang L, Yu C, Hu S, Zhang Y. (2016). Estimation of the disease burden attributable to 11 risk factors in Hubei Province, China: A comparative risk assessment. *International Journal of Environmental Research and Public Health, 13*(10), 944.

information. Global assessments serve to highlight major challenges facing the world community, and trends in such assessments indicate progress, if any, in improving the health of people worldwide. Such information is critical to the work of organizations such as WHO and UNICEF in their efforts to combat ill health and disease worldwide. This section highlights results of some of these global exercises for assessment of the disease burden and projections for the future.

The Global Burden of Disease Study

The 2015 Global Burden of Disease study constructed estimates of mortality, disability, and DALYs by cause for regions of the world. Demographic estimates of deaths in 2015 by age and sex form the basis of this work. It provides all-cause and cause-specific estimates for 195 countries for 249 causes from the year 1990 to 2015. The results were based on a variety of sources, including vital registrations systems, special studies, surveys, and expert opinion. This section summarizes some of the 2015 GDB data.

Mortality. Globally, in 2015, an estimated 55.8 million deaths occurred, 55% of whom were males. Approximately 20% of global deaths in 2015 were due to group I causes (communicable, maternal, neonatal, and

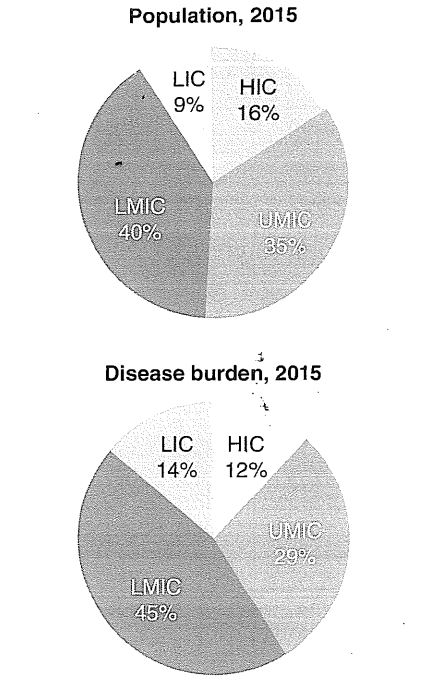


FIGURE 1-11 Global burden of disease, 2015, by income level of countries.

Data from World Health Organization. (2015). *Global burden of disease estimates*. http://www.who.int/healthinfo/global_burden_disease/en/

nutritional diseases), 71% were due to noncommunicable diseases, and 9% were due to injuries. Ischemic heart disease, cerebrovascular disease, and chronic obstructive pulmonary disease were the top three causes of death. Road traffic injuries, self-harm, falls, interpersonal violence, and drowning were the top five causes of injury-related deaths in 2015. Approximately 5.8 million deaths occurred in children younger than 5 years of age globally, with more than 80% of these fatalities being caused by group I causes. Of those under-5 deaths, 79% occurred in the African and Southeast Asia regions. An inordinate share of the mortality burden at the beginning of this century was found in LMICs, even among adults.

TABLE 1-8 shows the differences in the 10 leading causes of deaths in 2015 for high- and low-income countries. The presence of perinatal conditions, tuberculosis, HIV/AIDS, and malaria in the low-income world is indicative of the high impact of these conditions on premature mortality. These conditions are absent from the top 10 causes in the high-income countries, reflecting the success in combating these infectious conditions in the modern era. It is important to note that noncommunicable diseases such as cerebrovascular diseases and ischemic heart disease had already become prominent causes of premature deaths in the low-income world in 2015.

TABLE 1-7 Historical Distribution of Disease Burden Within Countries

Country	Disease Burden in Disease Categories (of 100%) Group I	Group II	Group III
Low-Income Nations (GNI per capita: $1,045 or less)*			
Benin	60	30	10
Guinea	65	26	9
Haiti	40	45	15
Mozambique	64	27	9
Lower Middle-Income Nations (GNI per capita: $1,046–$4,125)			
Bangladesh	32	59	9
Cambodia	33	54	13
Egypt	21	72	7
Uzbekistan	26	64	10
Upper Middle-Income Nations (GNI per capita: $4,126–$12,736)			
Colombia	13	67	20
Mauritius	9	84	7
Mexico	13	75	13
Turkmenistan	24	65	11

Note: Disease classification system: Group I: Communicable, infectious, maternal, and perinatal; Group II: Noncommunicable and chronic; Group III: Injuries and accidents.
* Gross national income (GNI) per capita calculated using the World Bank Atlas method.
Data from WHO and World Bank, 2015.

Disability. The GBD study 2015 update also provides an evaluation of the contributions made by specific conditions to disability in the world. Leading causes of disability in 2015 worldwide are shown in

TABLE 1-8 Leading Causes of Deaths in High-Income and Low-Income Countries, 2015

High-Income Countries		Low-Income Countries	
Rank	**Cause**	**Rank**	**Cause**
1	Ischemic heart disease	1	Lower respiratory infections
2	Cerebrovascular disease	2	HIV/AIDS
3	Alzheimer's and other dementias	3	Diarrheal diseases
4	Lung cancer	4	Malaria
5	Lower respiratory tract infection	5	Cerebrovascular disease
6	Chronic obstructive pulmonary disease	6	Ischemic heart disease
7	Colorectal cancers	7	Tuberculosis
8	Chronic kidney disease	8	Congenital defects
9	Diabetes	9	Neonatal preterm birth complications
10	Breast cancer	10	Neonatal encephalopathy

Data from GBD, 2015 (Based on the World Bank income categories).

TABLE 1-9. Neuropsychiatric and behavioral conditions, musculoskeletal disorders, and diabetes dominate the causes of disability, accounting for 5 of the top 10 conditions. However, a diverse spectrum of conditions, such as iron-deficiency anemia, skin diseases, and oral disorders, also appear on the list. A unique contribution of the GBD work has been its placement of nonfatal health outcomes in the center of international health policy in recent years. The important, and yet often ignored, effects of these conditions are obvious once disability is counted in these estimates of disease burden.

Disease Burden. Based on the estimation of deaths and disability presented in the preceding subsection, the global disease burden for 2015 was estimated using DALYs. Leading causes of the global burden in 2015 (**TABLE 1-10**) indicate how those conditions affect the global disease burden. The top 10 list is a mixture of communicable and perinatal conditions, noncommunicable diseases, and road traffic injuries. This situation highlights the challenge facing the global health community as it simultaneously continues to fight infectious diseases, seeks to improve the response to chronic conditions, and prepares to meet the increasing impact of injuries.

Age and Disease Distributions. **FIGURE 1-12** illustrates the distribution of the global burden in 2015 by disease groups and demonstrates the growing relative impact of chronic diseases (group II) over infectious conditions (group I). **FIGURE 1-13** provides comparable figures for loss of healthy life in seven major regions of the world. Note that communicable diseases still represent a considerable portion of the disease burden in 2015, especially in sub-Saharan Africa.

As the figures demonstrate, various subregions within middle- and low-income countries are at different stages of the epidemiologic transition. The influx of chronic diseases has added another layer of problems in some areas, while the burden of communicable diseases has not yet been eradicated. This "double burden" poses a major challenge for the health systems in these nations. In addition, the scarcity of resources in many of these countries makes the situation even more critical, and it becomes imperative to define interventions that are cost-effective and able to reduce the burden of disease.

Other Ways Burden Can Be Measured

Mortality and morbidity alone have been used for decades for international comparisons of disease

TABLE 1-9 Leading Causes of Disability Losses Globally, 2015

Rank	Cause
1	Lower back and neck pain
2	Sense organ diseases
3	Depressive disorders
4	Iron-deficiency anemia
5	Skin diseases
6	Diabetes
7	Migraine
8	Other musculoskeletal disorders
9	Anxiety disorders
10	Oral disorders

Note: Disability losses are defined by years of life lived with disability (YLD). Ranking is based on YLD rates for all age groups, both sex and level 3 cause (http://ihmeuw.org/44lj).
Source: Institute for Health Metrics and Evaluation, 2015.
Data from GBD, 2015.

TABLE 1-10 Leading Cause of Global Burden of Disease, 2015

Rank	Cause
1	Ischemic heart disease
2	Cerebrovascular disease
3	Lower respiratory infections
4	Low back and neck pain
5	Neonatal preterm birth complications
6	Diarrheal diseases
7	Sense organ disease
8	Neonatal encephalopathy
9	Road traffic injuries
10	HIV/AIDS

Data from Institute for Health Metrics and Evaluation, 2015. Ranking based on DALYs rates for all age groups, both sex for 2015 and level 3 cause. Retrieved from http://ihmeuw.org/44lk.

burden. Mortality among children younger than 5 years is considered a sensitive indicator of the overall health of nations, but especially of the health of women and children. UNICEF publishes an annual *State of the World's Children* report (UNICEF, 2016) that includes a ranking of nations based on this indicator (**TABLE 1-11**).

Gross national income (GNI) per capita is an indicator of national wealth, and the relationship between these variables usually follows an expected sequence, such that the country with the lowest GNI per capita has the worst indicators of health. However, as Table 1-11 indicates, even countries that have relatively higher per capita income can have poor indicators of health service accessibility (e.g., proportion of newborns protected against tetanus). For example, the per capita GNI for Mongolia is higher than that for Nicaragua, yet both the countries rank 84th for under-5 mortality, with lower life expectancy in Mongolia compared to Nicaragua. Such examples demonstrate that the relationship between health and poverty is complex and needs in-depth investigation. When seeking to improve the health of nations, both absolute poverty and the disparities within societies

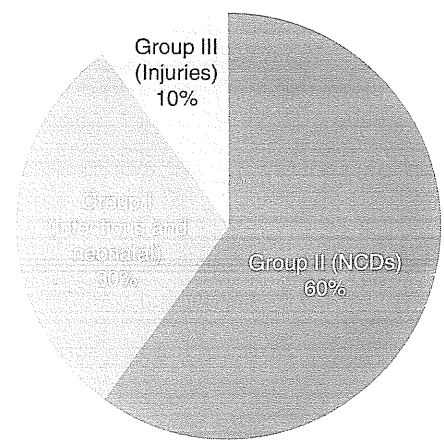


FIGURE 1-12 Global burden of disease 2015 by disease groups.
Data from GBD, 2015.

serve as impediments to empowerment of the poor and needy, especially women and children.

Projections

Forecasts of disease burden have been attempted with the intent of providing some basis for health planning. Making such projections is a challenging task

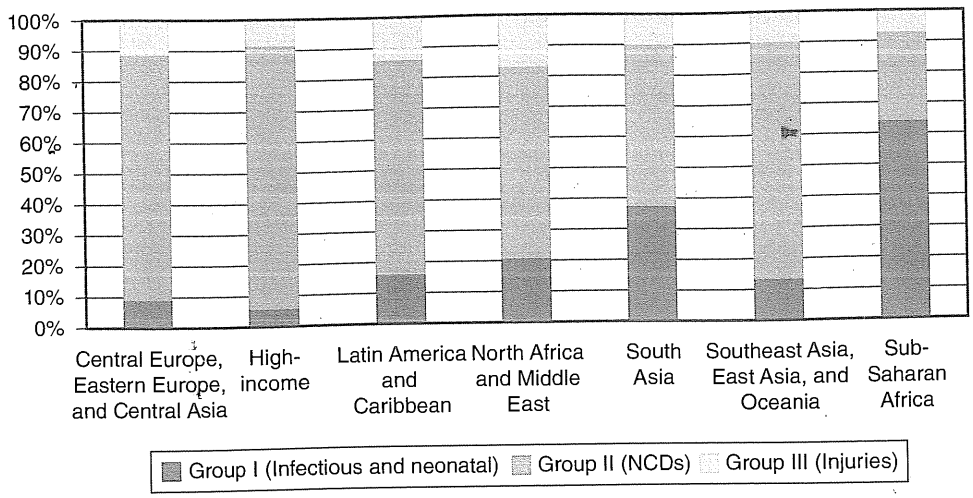


FIGURE 1-13 Proportion of disease burden by disease groups in selected regions, 2015.

Data from GBD, 2015.

TABLE 1-11 Health Status Indicators and National Income for Selected Low- and Middle-Income Countries

Country	Ranking by Child Mortality (<5 years)	Life Expectation at Birth, 2015 (years)	Stunted Children <5 Years (%)	Newborns Protected Against Tetanus *(%)	Gross National Income per Capita, 2014 (U.S. dollars)
Afghanistan	16	61	41	70	680
Angola	1	53	29	78	4,126 to 12,735
Bhutan	67	70	34	83	2,370
Guatemala	71	72	47	85	3,430
Mongolia	84	70	11	—	4,280
Nicaragua	84	75	23	81	1,870
Niger	10	62	43	81	410
Pakistan	22	66	45	75	1,400
Peru	99	75	15	85	6,360
Sierra Leone	5	51	38	85	700

* Modeling is done based on pregnant women who were given two doses or more of tetanus toxoid vaccine to calculate the percentage of births that can be considered as protected against tetanus.
Data from UNICEF, 2016.

that requires further data manipulations and the use of assumptions. These assumptions must predict changes in disease prevalence and incidence over time, the effects of interventions, and other factors. As a result, all projections are estimates with substantial variations that are highly dependent on the data used to derive them.

The GBD 2015 study was conducted to provide burden of disease estimates for more than 200 health conditions. These estimates are available based on gender, age groups, countries, and regions, allowing for comparisons across different years. Estimates are available since 1990, and the current

leading causes of disease burden are presented in Table 1-10.

The dominance of chronic diseases on this list is obvious, although respiratory conditions still appear to be important. Injuries from road traffic crashes are the ninth leading cause of the global disease burden and are expected to rise in prominence.

The growing importance of noncommunicable diseases is a global phenomenon, and these conditions' impact on low- and middle-income countries and regions needs to be assessed. However, there is a persistent burden of respiratory infections and diarrheal diseases in these regions. The situation in the low- and middle-income world is one where the "triple burden" of persistent communicable diseases, prevalent noncommunicable conditions, and increasing injuries will call for an appropriate response from public health officials.

Burden of Disease Attributed to Risk Factors

An analysis of risk factors that underlie many important disease conditions can help inform policy decisions concerning interventions directed toward health promotion and disease reduction. For example, smoking, alcohol, hypertension, and malnutrition are risk factors for a variety of diseases, and specific interventions have been developed that may reduce their prevalence. Risk factors include an array of human behaviors, nutritional deficiencies and excesses, substance abuse, and certain characteristics such as hypertension. Some factors are both an outcome and a risk factor (hypertension), some are challenging to measure (violence), and yet others (smoking and alcohol) lead to many possible disease outcomes. The linkage between an identified risk factor and the set of associated disease outcomes may be difficult to directly quantify, and the portion of specific disease prevalence attributable to any one factor may be problematic.

Relationships such as those shown in **FIGURE 1-14** require careful assessment to determine the proportion of heart disease to be attributed to hypertension in relation to other interacting causal factors. The best way to determine the portion of disease that may be ascribed to hypertension is through randomized trials with careful assessment of disease outcomes over time: Results from studies that control hypertension have shown a reduction of death and disability from not only cardiac disease, but also from cerebrovascular and renal diseases.

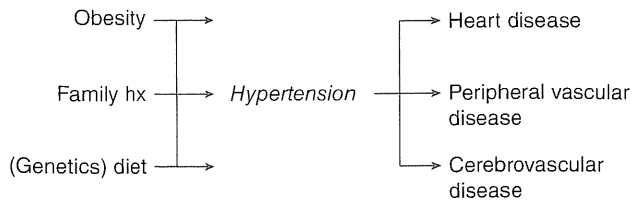


FIGURE 1-14 Flowchart of a "disease" and "risk factor" – Hypertension.

Because the most important purpose of risk factor analysis is to assist in decision making about the allocation of resources, the link between the various risk factors and potential interventions to reduce those risks should be clear. The effectiveness of interventions against risk factors ultimately should be judged by their ability to reduce the amount of healthy life lost attributed to the diseases that the risk factor affects. For the evaluation of an intervention that reduces hypertension, for example, the healthy life losses from the entire range of diseases that hypertension influences are required.

Although understanding the underlying factors that lead to disease and the complex interrelations in the web of causation has long been a major focus of epidemiology (Rothman, 2012), most analyses of the relationships of risk factors to specific diseases have been done in the context of individual risk factors in limited settings and with wide variations in the criteria for risk assessment. As a consequence, comparisons of risk factors as determinants of disease on a population health level are problematic.

The Burden of Selected Major Risk Factors

The model used in recent GBD studies for causal attribution of health outcomes is based on *counterfactual analysis* that focuses on risk factor compared to a counterfactual risk distribution (Ezzati et al., 2002). Within this analysis, the contribution of one risk factor, or a group of risk factors, to disease or mortality was estimated by comparing the current or future disease burden with the levels that would be expected under an alternative hypothetical scenario. This involves an evaluation of the effect that a risk factor has on a disease and its consequences, by setting the risk factor to its minimum while keeping all other factors constant. This method has the advantage of showing the potential gains by risk reduction from all levels of suboptimal exposure in a consistent way across risk factors (Ezzati et al., 2002).

The Comparative Risk Assessment (CRA) part of GBD 2015, for example, carried out a systematic evaluation of 79 risk factors divided into three main groups (referred to as "level 1")—behavioral, environmental

and occupational, and metabolic risks—relative to global and regional burdens of disease using a specific model for analysis (WHO, 2002a). Recently, the analysis was conducted from 1990 to 2015 for 17 level 2 risk factors (Global Burden of Disease Risk Factors Collaborators, 2016). As shown in part (a) of **FIGURE 1-15**, the five leading risks for mortality on a global level are dietary risks (19%), high systolic blood pressure (17%), tobacco smoke (11%), air pollution (10%), and high fasting plasma glucose (8%); together these account for 65% of global mortality. These five factors especially increase risks for heart disease, diabetes, and cancer and have major consequences for countries across all income groups. Part (b) of Figure 1-15

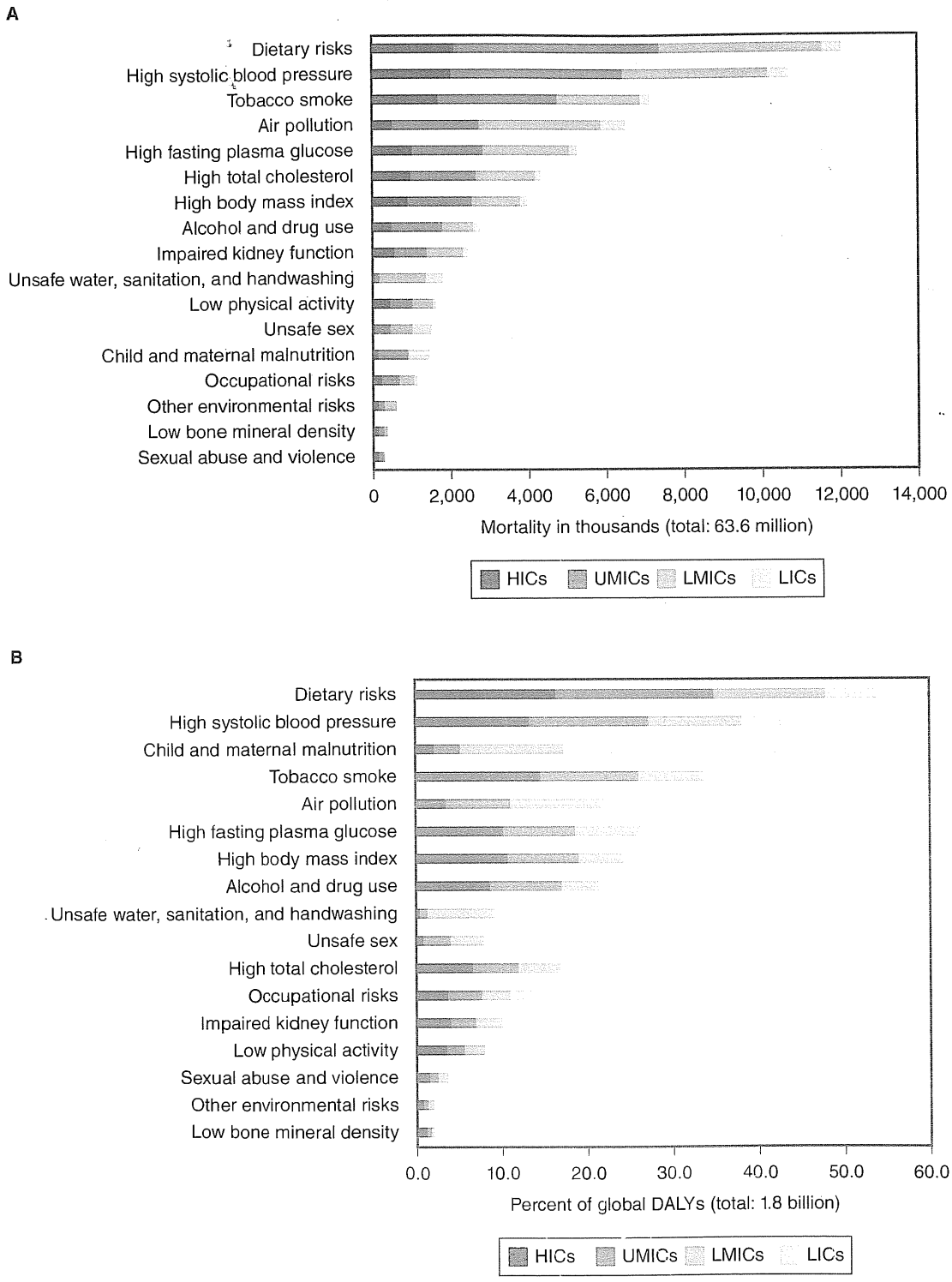


FIGURE 1-15 Mortality (a) and DALYs (b) due to 19 leading risk factors by country income level, 2015.

Data from GBD, 2015.

shows the main risks for burden of disease (DALYs) on a global level, with dietary risks (15%), high systolic blood pressure (12%), child and maternal malnutrition (9%), tobacco smoke (9%), and air pollution (9%) accounting for more than half of the global DALYs. These estimates show the contribution of behavioral and environmental risk factors toward development of group II diseases.

The recent reductions in environmental risk factors mostly stem from reductions in unsafe water, unsafe sanitation, poor hygiene, and household air pollution. In terms of behavioral risk factors, smoking is among five top risk factors contributing to DALYs at the regional level. Alcohol and drug abuse is largely a problem for men, contributing to 7% of burden of disease in 2015, but those mainly affected vary greatly by geographic region: This factor has its greatest impact on men in Southeast Asia, South Asia, and Central and Eastern European countries (Institute for Health Metrics and Evaluation, 2015).

Eight level 2 risk factors—dietary risks, high blood pressure, high total cholesterol, air pollution, tobacco, high fasting plasma glucose, high body mass index, and low physical activity—account for more than 90% of ischemic heart disease (the leading cause of death worldwide). Although these major risk factors are associated with high-income countries, more than 88% of the total global burden of disease that they cause occurs in LMICs (Institute for Health Metrics and Evaluation, 2015). Some risk factors may have few effects on the total global burden of disease, yet be very important locally within certain populations and regions. For example, iodine deficiency affects certain LMICs and results in substantial disability in those populations.

The demographic and epidemiologic transitions discussed earlier in this chapter affect shifts in these major risk factors by changing social, economic, and political trends and their complex interactions. Low-income countries continue to struggle against the high burdens of infectious diseases, malnutrition (including undernutrition and micronutrient deficiencies), and maternal and child health problems; at the same time, they must deal with the additional burdens of high levels of noncommunicable disease and injuries. WHO has estimated that if such types of risks did not exist, global life expectancy would be 10 years longer (Mathers, Stevens, & Mascarenhas, 2009).

Conclusion

The health of populations is the fundamental concern of global public health. The first step in the pursuit of population health improvement is the measurement of health and disease. Measurement is required to establish the magnitude of disease problems, define causal factors, explore potential solutions, and determine the impact of interventions. Measuring the impact of diseases on populations in terms of mortality and morbidity and their consequences is essential for planning effective ways to reduce the burden of illness and for setting priorities.

The burden of disease in populations has been gauged in many ways. Examples include measures of mortality, such as infant mortality rates; demographic measures, such as expectation of life at birth; and measures of morbidity, such as days away from work. However, for purposes of comparison among populations and for assisting in health planning and resource allocation, a common denominator combining these factors is needed. Summary measures of population health based on the amount of healthy life lost from disability and from death have been developed to serve that purpose. Composite indicators (such as HeaLYs and DALYs) use duration of time (years, weeks, days) to measure the loss of healthy life from disease and the gain from interventions. These metrics are evolving into important tools for assisting health-related decision making. Nevertheless, to avoid misuse of such indicators, it is critical for those using them to understand the underlying assumptions and limitations and to meet the rather formidable data requirements. These summary measures also could be used to examine the burden of disease among subpopulations defined by sociocultural economic attributes and especially on vulnerable groups. Thus, they could be used for ensuring that health-related decisions consider equity as well as cost-effective criteria.

Trends in disease burden provide important clues about the success of ongoing health programs and the need for development of new interventions. At the same time, they reflect non-health-related factors that are important to the production or maintenance of health in populations. Inter-country and inter-regional comparisons allow for measuring progress among nations; they can highlight inequalities in health status and examine these disparities in relation to social, economic, educational, and other factors.

Health systems across the world are greatly affected by ongoing changes in disease profiles and population dynamics. These systems must develop the capacity to respond to such changes effectively within the resources of each nation. Decisions must be based on evidence about the patterns of diseases, their risk factors, and the effectiveness of alternative interventions. Timely collection and analysis of appropriate, high-quality data to support such evidence are

a prerequisite for improving equitable global health development.

Acknowledgments

The authors would like to express their gratitude to Nukhba Zia for the editorial support provided in the preparation of this chapter. The authors would also like to acknowledge the contributions of the late Dr. Richard H. Morrow, MD, MPH, who made significant contributions to previous iterations of this chapter.

Discussion Questions

1. How can data help achieve the main purpose of a health system in any country? Give examples.
2. What are the essential elements of a burden of disease assessment, and which types of data are the most challenging to obtain in a low-income country?
3. What are the relative strengths and weaknesses of summary measures such as HeaLYs and DALYs compared to more traditional indicators of disease burden such as infant or maternal mortality?
4. In your country or city, what would be the most appropriate set of indicators to assess the impact of chronic diseases on the population? Why?

Appendix 1

Some of the Health-Related SDG Indicators

Target 2.1: By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious, and sufficient food all year round

- 2.1.1 Prevalence of undernourishment

Target 2.2: By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women, and older persons

- 2.2.1 Prevalence of stunting
- 2.2.2 Prevalence of malnutrition

Target 3.1: By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births

- 3.1.1 Maternal mortality ratio
- 3.1.2 Proportion of births attended by skilled health personnel

Target 3.2: By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births

- 3.2.1 Under-5 mortality rate
- 3.2.2 Neonatal mortality rate

Target 3.3: By 2030, end the epidemics of AIDS, tuberculosis, malaria, and neglected tropical diseases and combat hepatitis, water-borne diseases, and other communicable diseases

- 3.3.1 Number of new HIV infections per 1,000 uninfected population, by sex, age, and key populations
- 3.3.2 Tuberculosis incidence per 1,000 population
- 3.3.3 Malaria incidence per 1,000 population
- 3.3.4 Hepatitis B incidence per 100,000 population
- 3.3.5 Number of people requiring interventions against neglected tropical diseases

Target 3.4: By 2030, reduce by one third premature mortality from noncommunicable diseases through prevention and treatment and promote mental health and well-being

- 3.4.1 Mortality rate attributed to cardiovascular disease, cancer, diabetes, or chronic respiratory disease
- 3.4.2 Suicide mortality rate

Target 3.5: Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol

- 3.5.1 Coverage of treatment interventions (pharmacological, psychosocial, and rehabilitation and aftercare services) for substance use disorders
- 3.5.2 Harmful use of alcohol, defined according to the national context as alcohol per capita consumption (aged 15 years and older) within a calendar year in liters of pure alcohol

Target 3.6: By 2020, halve the number of global deaths and injuries from road traffic accidents

- 3.6.1 Death rate due to road traffic injuries

Target 3.7: By 2030, ensure universal access to sexual and reproductive healthcare services, including for family planning, information and education, and the integration of reproductive health into national strategies and programs

- 3.7.1 Proportion of women of reproductive age (aged 15–49 years) who have their need for family planning satisfied with modern methods
- 3.7.2 Adolescent birth rate (aged 10–14 years; aged 15–19 years) per 1,000 women in that age group

Target 3.8 Achieve universal health coverage, including financial risk protection, access to quality essential healthcare services, and access to safe, effective, quality, and affordable essential medicines and vaccines for all

- 3.8.1 Coverage of essential health services
- 3.8.2 Number of people covered by health insurance or a public health system per 1,000 population

Target 3.9: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water, and soil pollution and contamination

- 3.9.1 Mortality rate attributed to household and ambient air pollution
- 3.9.2 Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe Water, Sanitation and Hygiene for All [WASH] services)
- 3.9.3 Mortality rate attributed to unintentional poisoning

Target 4.2: By 2030, ensure that all girls and boys have access to quality early childhood development, care, and pre-primary education so that they are ready for primary education

- 4.2.1 Proportion of children under 5 years of age who are developmentally on track in health, learning, and psychosocial well-being, by sex

Target 5.2: Eliminate all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation

- 5.2.1 Proportion of ever-partnered women and girls aged 15 years and older subjected to physical, sexual, or psychological violence by a current or former intimate partner in the previous 12 months, by form of violence and by age
- 5.2.2 Proportion of women and girls aged 15 years and older subjected to sexual violence by persons other than an intimate partner in the previous 12 months, by age and place of occurrence

Target 5.6: Ensure universal access to sexual and reproductive health and reproductive rights

- 5.6.2 Number of countries with laws and regulations that guarantee women aged 15–49 years access to sexual and reproductive health care, information, and education

Target 6.1: By 2030, achieve universal and equitable access to safe and affordable drinking water for all

- 6.1.1 Proportion of population using safely managed drinking water services

Target 6.2: By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations

- 6.2.1 Proportion of population using safely managed sanitation services, including a hand-washing facility with soap and water

Target 8.8 Protect labor rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment

- 8.8.1 Frequency rates of fatal and nonfatal occupational injuries, by sex and migrant status

Target 11.5: By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations

- 11.5.1 Number of deaths, missing persons, and persons affected by disaster per 100,000 people

Target 11.7 By 2030, provide universal access to safe, inclusive, and accessible green and public spaces, in particular for women and children, older persons, and persons with disabilities

- 11.7.2 Proportion of persons who are victims of physical or sexual harassment, by sex, age, disability status, and place of occurrence, in the previous 12 months

Target 16.1: Significantly reduce all forms of violence and related death rates everywhere

- 16.1.1 Number of victims of intentional homicide per 100,000 population, by sex and age
- 16.1.2 Conflict-related deaths per 100,000 population, by sex, age, and cause
- 16.1.3 Proportion of population subjected to physical, psychological, or sexual violence in the previous 12 months
- 16.1.4 Proportion of population that feel safe walking alone around the area they live

Target 16.2 End abuse, exploitation, trafficking, and all forms of violence against and torture of children

- 16.2.1 Proportion of children aged 1–17 years who experienced any physical punishment and/or psychological aggression by caregivers in the past month
- 16.2.3 Proportion of young women and men aged 18–29 years who experienced sexual violence by age 18

Reproduced from United Nations. Sustainable Development Goals. SDG Indicators. Retrieved from: https://unstats.un.org/sdgs/metadata/

References

Allen, K. (2010). A national burden of disease study for the United Arab Emirates (UAE): Quantifying mortality and morbidity differentials between nationals and migrants, 2010. Unpublished doctoral thesis. Baltimore, MD: Johns Hopkins Bloomberg School of Public Health.

Anand, S., & Hanson, K. (1997). Disability-adjusted life years: A critical review. *Journal of Health Economics, 16*(6), 685–702.

Anker, M., Black, R. E., Coldham, C., Kalter, H. D., Quigley, M. A., Ross, D., & Snow, R. W. (1999). A standard verbal autopsy method for investigating causes of death in infants and children. WHO/CDS/CSR/ISR/99.4. Geneva, Switzerland: World Health Organization.

Barendregt, J. J., Bonneux, L., & Van der Maas, P. J. (1996). DALYs: The age-weights on balance. *Bulletin of the World Health Organization, 74*(4), 439–443.

Barker, C., & Green, A. (1996). Opening the debate on DALYs (disability-adjusted life years). *Health Policy and Planning, 11*(2), 179–183.

Barnum, H. (1987). Evaluating healthy days of life gained from health projects. *Social Science and Medicine, 24*(10), 833–841.

Begg, S., Vos, T., Barker, B., Stevenson, C., Stanley, L., & Lopez, L. D. (2007). *The burden of disease and injury in Australia 2003.* Canberra, Australia: Australian Institute of Health and Welfare.

Blumstein, J. F. (1997). The Oregon experiment: The role of cost–benefit analysis in the allocation of Medicaid funds. *Social Science and Medicine, 45*(4), 545–554.

Bobadilla, J. L. (1998). *Searching for essential health services in low and middle income countries: A review of recent studies on health priorities.* Washington, DC: Inter American Development Bank.

Bradshaw, D., Groenewald, P., Laubscher, R., Nannan, N., Nojilana, B., Norman, R., . . . Johnson, L. (2003). Initial burden of disease estimates for South Africa, 2000. *South African Medical Journal, 93*(9), 682–688.

Busschbach, J. J. V., Hesing, D. J., & de Charro, F. T. (1993). The utility of health at different stages of life: A qualitative approach. *Social Science and Medicine, 37*(2), 153–158.

Coale, A. J., Demeny, P., & Vaughan, B. (1983). *Regional model life tables and stable populations. Studies in population.* New York, NY/London, UK: Academic Press.

Coale, A. J., & Guo, G. (1989). Revised regional model life tables at very low levels of mortality. *Population Index, 55*(4), 613–643.

Crooper, M., & Kopits, E. (2003). *Traffic fatalities and economic growth. World Bank Policy Research Working Paper 3035.* Washington, DC: World Bank.

Eddy, D. M. (1991). Oregon's methods. Did cost-effectiveness analysis fail? *Journal of the American Medical Association, 266*(15), 2135–2141.

Evans, J. R., Hall, K. L., & Warford, J. (1981). Shattuck Lecture: Health care in the developing world: problems of scarcity and choice. *New England Journal of Medicine, 305*(19), 1117–1127. doi: 10.1056/NEJM198111053051904

Ezzati, M., Lopez, A. D., Rodgers, A., Vander Hoorn, S., Murray, C. J., & Comparative Risk Assessment Collaborating Group. (2002). Selected major risk factors and global and regional burden of disease. *Lancet, 360*(9343), 1347–1360. doi: 10.1016/S0140-6736(02)11403-6

Figgis, P., & Walters, C. (2015–2017). Depleting resources adding pressure to healthcare. Retrieved from http://www.pwc.com/gx/en/industries/healthcare/emerging-trends-pwc-healthcare/depleting-resources.html

GBD 2015 Mortality and Causes of Death Collaborators. (2016). Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: A systematic analysis for the Global Burden of Disease study 2015. *Lancet, 388*(10053), 1459–1544. doi: 10.1016/S0140-6736(16)31012-1

Ghana Health Assessment Team. (1981). A quantitative method of assessing the health impact of different diseases in less developed countries. *International Journal of Epidemiology, 10*(1), 73–80.

Global burden of disease and risk factors. (2006). Washington, DC/New York, NY: International Bank for Reconstruction and Development, World Bank, & Oxford University Press.

Global Burden of Disease Risk Factors Collaborators. (2016). Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2015: A systematic analysis for the Global Burden of Disease study 2015. *Lancet, 388*(10053), 1659–1724. doi: 10.1016/S0140-6736(16)31679-8

Global Burden of Disease Risk Factors Collaborators, Forouzanfar, M. H., Alexander, L., Anderson, H. R., Bachman, V. F., Biryukov, S., . . . Murray, C. J. (2015). Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks in 188 countries, 1990–2013: A systematic analysis for the Global Burden of Disease study 2013. *Lancet, 386*(10010), 2287–2323. doi: 10.1016/S0140-6736(15)00128-2

Gold, M. R. (1996). *Cost-effectiveness in health and medicine.* New York, NY: Oxford University Press.

Hill, K. (2001). *Demographic techniques: Indirect estimation.* Oxford, UK: Elsevier Science.

Hill, K. (2003). *Adult mortality in the developing world: What we know and how we know it.* Paper presented at the Training Workshop on HIV/AIDS and Adult Mortality in Developing Countries, New York, NY.

Hyder, A. A., & Morrow, R. H. (1999). Steady state assumptions in DALYs: Effect on estimates of HIV impact. *Journal of Epidemiology and Community Health, 53*(1), 43–45.

Hyder, A. A., Rotllant, G., & Morrow, R. H. (1998). Measuring the burden of disease: healthy life-years. *American Journal of Public Health, 88*(2), 196–202.

Institute for Health Metrics and Evaluation. (2015). GBD Compare. Retrieved from http://www.healthdata.org/data-visualization/gbd-compare

Jamison, D. T., Breman, J. G., Measham, A. R., Alleyne, G., Claeson, M., Evans, D. B., . . . Musgrove, P. (Eds). (2006). *Disease control priorities in developing countries.* Washington, DC/New York, NY: International Bank for Reconstruction and Development, World Bank, & Oxford University Press.

Kaplan, R. M., & Anderson, J. P. (1996). The general health policy model: An integrated approach. In B. Spilker (Ed.), *Quality of life and pharmacoeconomics in clinical trials* (2nd ed., Chapter 32, pp. 309–322). Philadelphia, PA: Lippincott-Raven Publishers.

Last, J. M., Spasoff, R. A., & Harris, S. S. (Eds). (2000). *A dictionary of epidemiology* (4th ed). New York, NY: Oxford University Press.

Lim, S. S., Vos, T., Flaxman, A. D., Danaei, G., Shibuya, K., Adair-Rohani, H., . . . Memish, Z. A. (2012). A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: A systematic analysis for the Global Burden of Disease study 2010. *Lancet, 380*(9859), 2224–2260. doi: 10.1016/S0140-6736(12)61766-8

Lozano, R., Naghavi, M., Foreman, K., Lim, S., Shibuya, K., Aboyans, V., . . . Memish, Z. A. (2012). Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: A systematic analysis for the Global Burden of Disease study 2010. *Lancet, 380*(9859), 2095–2128. doi: 10.1016/S0140-6736(12)61728-0

Mahapatra, P. (2001). *Estimating national burden of disease: The burden of disease in Andhra Pradesh 1990s*. Hyderabad: Institute of Health Systems.

Mathers, C., Stevens, G., & Mascarenhas, M. (2009). *Global health risks: Mortality and burden of disease attributable to selected major risks.* Geneva, Switzerland: World Health Organization.

Mathers, C., Vos, T., Lopez, A., Salomon, J., Lozano, R., & Ezzati, M. (Eds). (2001). *National burden of disease studies: A practical guide* (2nd ed.). Geneva, Switzerland: World Health Organization.

Ministry of Health (2016). *Health loss in New Zealand 1990–2013: A report from the New Zealand burden of diseases, injuries and risk factors study.* Wellington, NZ: Ministry of Health.

Morrow, R. H., & Bryant, J. H. (1995). Health policy approaches to measuring and valuing human life: conceptual and ethical issues. *American Journal of Public Health, 85*(10), 1356–1360.

Murray, C. J. L., & Chen, L. C. (1992). Understanding morbidity change. *Population & Development Review, third edition, 18.*

Murray, C., Lopez, A., Ahmad, O. B., Inoue, M., Fergusson, B., Salomon, J. A., . . . Hill, K. H. (2002). *World mortality in 2000: Life tables for 191 countries*. Geneva, Switzerland: World Health Organization.

Murray, C. J. L., & Lopez, A. D. (Eds). (1994). *Global comparative assessments in the health sector: Disease burden, expenditures and intervention packages.* Geneva, Switzerland: World Health Organization.

Murray, C. J. L., Salomon, J., Mathers, C., & Lopez, A. (2002). *Summary measures of population health: Concepts, ethics, measurement and applications.* Geneva, Switzerland: World Health Organization.

Nord, E. (1992). Methods for quality adjustment of life years. *Social Science and Medicine, 34*(5), 559–569.

Nord, E. (1993). Unjustified use of the Quality of Well-Being Scale in priority setting in Oregon. *Health Policy, 24*(1), 45–53.

Omran, A. (1971). The epidemiological transition: A theory of the epidemiology of population change. *Milbank Memorial Fund Quarterly, 49*, 509–538.

Petiti, D. B. (1994). *Meta-analysis, decision analysis and cost-effectiveness analysis: Methods for quantitative synthesis in medicine, second edition.* New York, NY: Oxford University Press.

Robine, J. M. (1994). *Disability free life expectancy trends in France: 1981–1991: International comparisons.* Paper presented at the Advances in Health Expectancies conference, Canberra, Australia.

Rothman, K. J. (2012). *Epidemiology: An introduction* (2nd ed.). Oxford, UK: Oxford University Press.

Salomon, J. A., Haagsma, J. A., Davis, A., de Noordhout, C. M., Polinder, S., Havelaar, A. H., . . . Vos, T. (2015). Disability weights for the Global Burden of Disease 2013 study. *Lancet Global Health, 3*(11), e712–e723. doi: 10.1016/S2214-109X(15)00069-8

Salomon, J. A., Vos, T., Hogan, D. R., Gagnon, M., Naghavi, M., Mokdad, A., . . . Jonas, J. B. (2012). Common values in assessing health outcomes from disease and injury: Disability weights measurement study for the Global Burden of Disease study 2010. *Lancet, 380*(9859), 2129–2143. doi: 10.1016/S0140-6736(12)61680-8

Thatte, N., Kalter, H. D., Baqui, A. H., Williams, E. M., & Darmstadt, G. L. (2009). Ascertaining causes of neonatal deaths using verbal autopsy: Current methods and challenges. *Journal of Perinatology, 29*(3), 187–194. doi: 10.1038/jp.2008.138

Torrance, G. W. (1986). Measurement of health state utilities for economic appraisal. *Journal of Health Economics, 5*(1), 1–30.

UNAIDS. (2017). *UNAIDS data 2017.* Geneva, Switzerland: Joint United Nations Programme on HIV/AIDS.

UNICEF. (2015). *Levels and trends in child mortality.* New York, NY: Author.

UNICEF. (2016). *The state of the world's children 2016: A fair chance for every child.* (2016). New York, NY: Author.

Weinstein, M. C., Siegel, J. E., Gold, M. R., Kamlet, M. S., & Russell, L. B. (1996). Recommendations of the Panel on Cost-Effectiveness in Health and Medicine. *Journal of the American Medical Association, 276*(15), 1253–1258.

Woolf, S. H., Aron, L., Dubay, L., Simon, S. M., Zimmerman, E., & Luk, K. X. (2015). *How are income and wealth linked to health and longevity?* Washington, DC: Urban Institute & Center on Society and Health.

World Bank. (1993). *World development report 1993: Investing in health.* New York, NY: Oxford University Press.

World Bank. (2015). *New country classifications.* Washington, DC: The World Bank Group. Retrieved from https://blogs.worldbank.org/opendata/new-country-classifications

World Health Organization (WHO). (1980). *International classification of impairments, disabilities and handicaps: A manual of classification relating to the consequences of disease.* Geneva, Switzerland: Author.

World Health Organization (WHO). (2000). *The world health report 2000.* Geneva, Switzerland: Author.

World Health Organization (WHO), Commission on Macroeconomics and Health. (2001). *Macroeconomics and health: Investing in health for economic development.* Geneva, Switzerland: Author.

World Health Organization (WHO). (2002a). *The Global Burden of Disease 2000 project: Aims, methods and data sources.* Geneva, Switzerland: Author.

World Health Organization (WHO). (2002b). *World report on violence and health.* Geneva, Switzerland: Author.

World Health Organization (WHO). (2002c). *The international classification of functioning, disability and health: Introduction.* Geneva, Switzerland: Author.

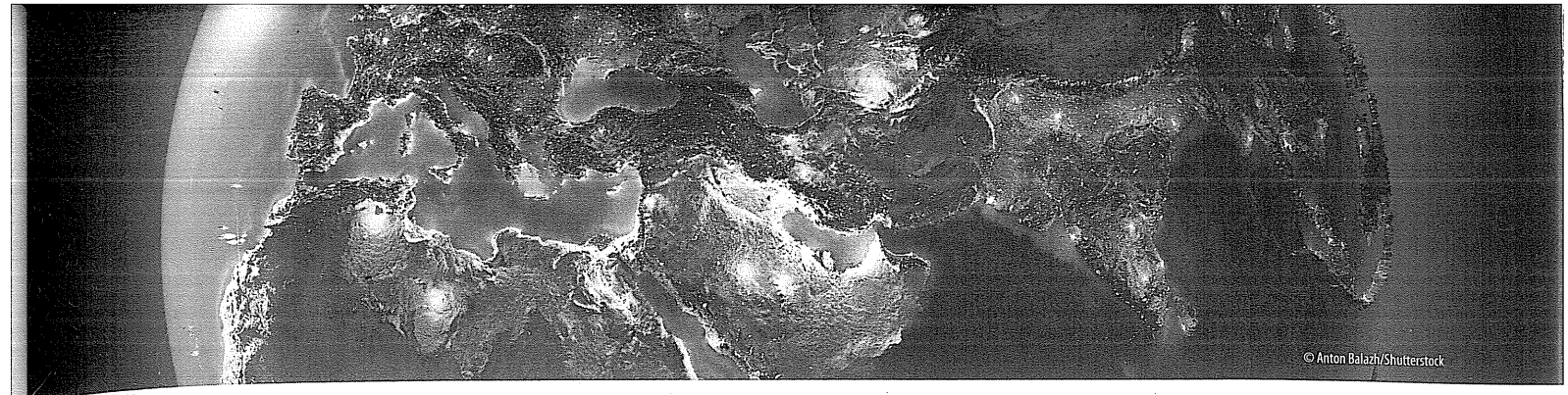
World Health Organization (WHO). (2003). *The world health report 2003: Shaping the future.* Geneva, Switzerland: Author.

World Health Organization (WHO). (2015). *Global status report on road safety.* (2015). Geneva, Switzerland: Author.

World Health Organization (WHO). (2016). International classification of diseases. Retrieved from http://www.who.int/classifications/icd/en/

World Health Organization (WHO). (2017). Global Health Observatory (GHO) data: HIV/AIDS. Retrieved from http://www.who.int/gho/hiv/en/

Zeckhauser, R., & Shephard, D. (1976). Where now for saving lives? *Law and Contemporary Problems, 40*(b), 5–45.



CHAPTER 4

Understanding and Acting on Social Determinants of Health and Health Equity

Rene Loewenson and Sarah Simpson

Introduction

A large and growing body of evidence shows that health improves when action is taken on the underlying causes of ill health, and particularly those causes that lead to social differences in ill health. "These underlying causes are complex, often reflecting systematic social, political, historical, economic and environmental factors that accumulate across people's lifetimes and are transferred across generations" (Sadana et al., 2014, p. 8). Such underlying social, economic, political, legal, and material factors that affect health are collectively called *social determinants of health* (SDH). Beyond biological processes in the human body and the disease-causing germs that are determinants of health, health outcomes have social origins, such as in the way people live and work and their economic and political systems, known as the social determinants of health. Identifying them enables us to understand and intervene to improve health, and has been a longstanding goal of public health measures. For example, such interventions may include measures to counter the marketing of tobacco to reduce smoking, or creation of cycling paths and green spaces in urban areas to promote physical activity.

These SDH have a general impact on health outcomes. With the global understanding that everyone has the right to the highest attainable standard of health (United Nations, 1976), there is also increasing international attention on social differences in health that are avoidable and unfair (termed "health inequities"). Beyond the broad understanding of the social factors that cause disease, the persistent and sometimes growing differences in health within and between social groups and countries raises questions about how SDH are associated with avoidable differences in the opportunities for a healthy life as well as the differential benefits from interventions for improved health. When this analytic lens is applied, those factors may be termed the *social determinants of health equity* (SDHE). This chapter explores the understanding and application of SDH to improve health, and, as a matter of increasing importance globally, to improve health equity.

DEFINITIONS

Equity is the absence of unfair, avoidable, or remediable differences among groups of people, whether those groups are defined socially, economically, demographically, or geographically (Regional Network on Equity in Health in East and Southern Africa [EQUINET], 2012).

Health inequities are systematic differences in health that can be avoided or remedied and that are therefore viewed as unfair or unjust (Commission on the Social Determinants of Health [CSDH], 2008). This is particularly so for health given the global context, in which the highest attainable standard of health is one of the fundamental rights of every human being (World Health Organization [WHO], 2006).

- *Health inequality* refers simply to differences in health between different individuals, without a normative judgment about those inequalities.

In a chapter in an earlier edition of this text, Kelly and Doohan (2014) explored in some detail how the understanding of social variations in ill health and its prevention developed over time. They described the causal pathways from SDH to individual disease outcomes and population-level patterns of disease.

This chapter does not seek to repeat their well-presented explanations of the causal pathways from SDH to health outcomes. Rather, it focuses on the *application* of the concepts, with examples from a range of countries globally, particularly from low- and middle-income countries (LMICs), especially those in east and southern Africa. The conceptual frameworks, discussed later, show how SDH can be organized into different and deepening levels, each of which incorporates different elements. We do not aim to discuss all the diverse SDH in this chapter, but instead present more detail on some of these elements, given their role in improving health and health equity.

Thus, this chapter describes published work on the following topics:

- The development of conceptual frameworks for understanding SDH and SDHE, including how these frameworks relate to frameworks for human rights and gender equality
- Intersectoral action for health (IAH) and health in all policies (HiAP) as approaches used to apply the conceptual understanding of different types and levels of SDH, from immediate material determinants to deeper socioeconomic and policy determinants, to improve health and health equity
- The implications of an SDH perspective for health systems and services, understanding the health system itself as a social determinant of health and health equity
- The roles of and interventions to address social exclusion, social agency, and power as cross-cutting SDH, affecting other sociopolitical, socioeconomic, and material determinants
- The increasingly global dimensions of SDH in a globalizing world, their role in national-level SDH, and the different levels of responses to them
- How to evaluate action on SDH aimed at improving health and health equity

Conceptual Frameworks for Understanding Social Determinants of Health and Health Equity

Analysis of the relationship between disease and the social and material environment dates back to ancient medico-philosophical systems. With advancing understanding of the causes of ill health and their origin in human activity, it has become clearer that socially determined health risks can be prevented, including as a matter of social justice (Kelly & Doohan, 2014). In recent decades, as public health has shifted its focus from individual risk–health relationships to more complex, multifactorial causal networks, a range of increasingly comprehensive conceptual frameworks have emerged, drawing on evidence to support analysis of the SDH and their role in health equity. This section explores how these conceptual frameworks have developed, with increasing attention over time to the relationship between SDH and health equity.

Turrell et al. (1999) identified SDH at three discrete, yet closely interrelated stages or levels—namely, *upstream*, *midstream*, and *downstream*. The upstream (or macro-level) factors include international influences, government policies, and the fundamental social, physical, economic, and environmental determinants of health. The midstream (or intermediate-level) factors include psychosocial factors, health-related behaviors, and the role of the healthcare system. Some social factors, such as

culture, beliefs, values, and norms, are seen to influence decision making, actions, and behavior at both upstream and midstream levels. The downstream (or micro-level) factors include physiological and biological functioning. This model has been used to identify interventions targeted at entry points in all three levels, either singly or in combination. While acting upstream (such as with tax policies) may have wider population effects, demonstrating its influence is often more complex.

Dahlgren and Whitehead (2007) developed a similarly multilayered and widely used "rainbow" model of determinants, shown in **FIGURE 4-1**. This model has at its core the individual biological determinants that are not considered to be SDH—age, sex, and constitutional—as characteristics affecting health that are largely fixed. From here, the framework adds layers of determinants that are socially determined from individual lifestyle factors; farther upstream are those factors and services that impact on health at the population level and that are theoretically modifiable by policy. This model shows not only the different levels, but also the preponderance of factors that may be considered as SDH. These factors may be health promoting (e.g., provision of adequate housing) or protective, by eliminating risk of disease (e.g., pollution control). In this model, healthcare services coexist with other determinants to impact on health. Dahlgren and Whitehead (2007) propose that a comprehensive health strategy should address and link the different levels of downstream and upstream determinants of health shown in Figure 4-1.

The Dahlgren and Whitehead model suggests the determinants that may be included in the definition of what is socially determined and the relationship between these different levels of SDH on health outcomes. Nevertheless, it does not show how these different SDH relate to health equity outcomes. The authors do, however, argue that the determinants of *inequities* in health may be different from the determinants of health. For example, poor working conditions may account for a higher share of the *difference* in the burden of disease between affluent and low-income groups than in the *overall* burden of disease. Thus, they argue that actions on SDH may not automatically address equity, and that specific attention needs to be paid to the *distributional* impact of those actions for them to achieve this goal. For example, urban

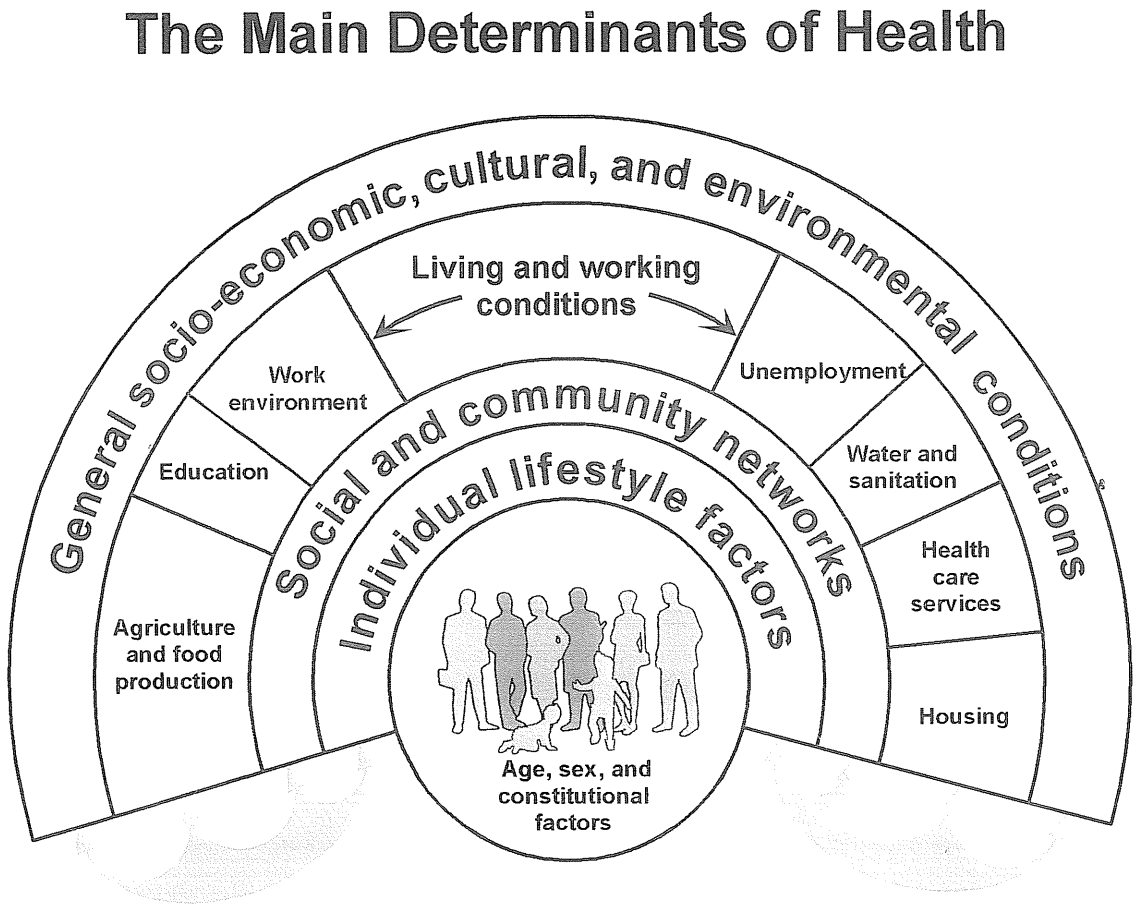


FIGURE 4-1 The "rainbow" model of determinants of health, including social determinants of health.

Reproduced from Dahlgren G., Whitehead M. (2007). *Levelling up (part 2): A discussion paper on European strategies for tackling social inequities in health*. Copenhagen, Denmark: WHO Regional Office for Europe. http://apps.who.int/iris/bitstream/10665/107791/1/E89384.pdf (accessed 22 June 2017).

developments to improve the quality of housing and green spaces are actions on SDH that may improve health, but may also raise housing costs and push local residents into more marginal urban zones, forcing them out from areas where they have been long-time residents. This trend will affect the distribution of health benefits, unless specific measures are in place to protect their tenure or well-being.

The *social gradient* in health describes the pattern that is formed by comparing health outcome measures with some measure of social position, such as occupation, education, or income (Kelly & Doohan, 2014). A population-level public health intervention that affects the whole population in the same way may shift the gradient upward by the same amount for all, without affecting the relative differences between the different social groups.

If the goal of a policy or an intervention is to improve health equity, the rate of improvement should be faster for those groups whose starting point is worse initially, making the health gradient less steep (Kelly & Doohan, 2014). If the gradient simply shifts upward at the same rate for all groups, such that all groups improve at the same rate in their absolute outcomes, then the relative differences between the groups remain unchanged—and in that sense, health inequity has not changed. Population health interventions that are applied universally to address specific SDH without taking social differentials into account may, indeed, worsen inequalities in outcomes. For example, as health technologies are introduced or health screening scales up, uptake may initially be more rapid in wealthier households, which widens (rather than narrows) the social gradient, unless specific measures are implemented to promote uptake in poorer groups (**EXHIBIT 4-1**). A more detailed discussion of absolute and relative measures of social status and their relationship to absolute and relative measures of health outcomes can be found in the chapter by Kelly and Doohan (2014).

EXHIBIT 4-1 Closing the Equity Gap: A Case Study of the Health Gradient

This example illustrates the way the health gradient does, and does not, respond to new public health interventions and the "stubborn" influence of SDH. In the state of Ceará, in a poor area of northeastern Brazil, the 1980 infant mortality rate was greater than 100 infant deaths per 1,000 live births and malnutrition was common. Based on the findings of a 1986 statewide survey of child health and nutrition, new health policies were implemented, including growth monitoring, oral rehydration, breastfeeding promotion, immunization, and vitamin A supplementation—interventions collectively known as GOBI (growth monitoring, oral rehydration, breastfeeding, and immunization). As lack of access to health services was a major problem, community health workers and traditional birth attendants were widely introduced and responsibility for health services was decentralized to rural municipalities, where health indicators were poorest. A social mobilization campaign for child health used media and small radio stations to broadcast educational messages. This work was supported by four consecutive state governors, all of whom gave high priority to improving child health, and the outcomes were reviewed through surveys in 1990 and 1994.

The surveys showed improved population coverage of the four GOBI interventions by 1994. The use of oral rehydration increased to more than 50% in children with diarrhea; nearly all children had a growth chart, and half had been weighed within the previous three months; immunization coverage rose above 90%; and the median breastfeeding duration increased from 4.0 months to 6.9 months. These improvements were noted in all income groups. The prevalence of low-weight-for-age and low-height-for-age children in the population younger than age 5 fell from 13% to 9% and from 27% to 18%, respectively, while diarrheal disease incidence in the previous two weeks was nearly halved.

While the child health interventions were applied to all families, including the poorest, the social differentials in disease and infant mortality rate between rich and poor remained largely unchanged between 1987 and 1994. In that period, family income inequalities persisted and remained largely unchanged. Diarrheal disease incidence remained approximately 60% higher among poor children, income inequalities remained largely unchanged, and the inequity ratio between rich and poor persisted.

One explanation for these findings given by the authors of the Ceará study was that wealthy families had made greater and earlier use of both public-sector and private-sector services to protect their children's health. They noted that even when public health programs are targeted at the poorest households, it is difficult to close the inequity ratio group if the richer households have not yet themselves achieved high levels of coverage with the specific services. The conclusions suggested that, even when public health programs are targeted at the poorest members of a society, the wealthiest are likely to continue to benefit from the introduction of new health technologies, and that further investments are needed to make existing and new interventions more widely accessible to the poorest populations so as to change the health gradient and close the inequity gap (Bonnefoy et al., 2007; Victora et al., 2000, cited in Kelly & Doohan, 2014).

Dahlgren and Whitehead (2007) note that understanding how SDH are linked to improving health equity calls for investigation of what is causing the social gradients in exposure to different health hazards and in access to health-promoting or health-protective factors, such as those described in Exhibit 4-1. Analysis of these SDH associated with distributional outcomes is used to identify the approaches and additional resources that may be needed to address social gradients in health, such as through "leveling-up" strategies. Once these SDH that have positive or negative influence on social gradients are identified, specific strategies can be designed to integrate them within health policies and programs. Dahlgren and Whitehead argue further that policies and programs that influence health should be assessed for their distributional impacts across different socioeconomic groups.

The SDH that have a distributional impact may arise within any of the bands of SDH in the rainbow model shown in Figure 4-1. For example, social position is an important determinant of inequities in health, as are social networks and health behaviors. Groups that are socially and economically better off typically have more power and opportunities to live a healthy life than groups that are less privileged (Australian Institute of Health and Welfare [AIHW], 2012). Legal and institutional arrangements, political and market forces can consolidate these inequalities. The relationships are not purely negative. In contrast, and as exemplified in Exhibit 4-8, shown later, education may be a positive factor in closing inequalities, as it can enhance the power and opportunity of less privileged groups to avoid unhealthy living and working conditions. The freedom and power that people have to influence their own life and society, including through greater political and economic democracy and through control of commercial markets (such as marketing of alcohol), is also a positive factor in tackling social inequities in health (EQUINET, 2012; EQUINET SC, 2007).

Given the increasing concern voiced regarding remediable inequalities in health, Solar and Irwin (2010) elaborated the conceptual framework that was used by the WHO's Commission on Social Determinants of Health (CSDH). This framework, shown in **FIGURE 4-2**, makes an explicit connection to health equity by seeking to profile how SDH relate to and address unfair, avoidable, or remediable differences in health among population groups, as an appeal to ethical norms and a matter of social justice.

The CSDH framework repeats many elements of the earlier frameworks for SDH, but applies an equity lens. It locates SDH within a hierarchy of structural and intermediary determinants that gives specific focus to the political, social, and economic contexts and institutions and the cultural and societal values (all SDH) that *generate, configure, and maintain social hierarchies and that stratify people* by income, education, occupation, gender, race/ethnicity, and other factors (also

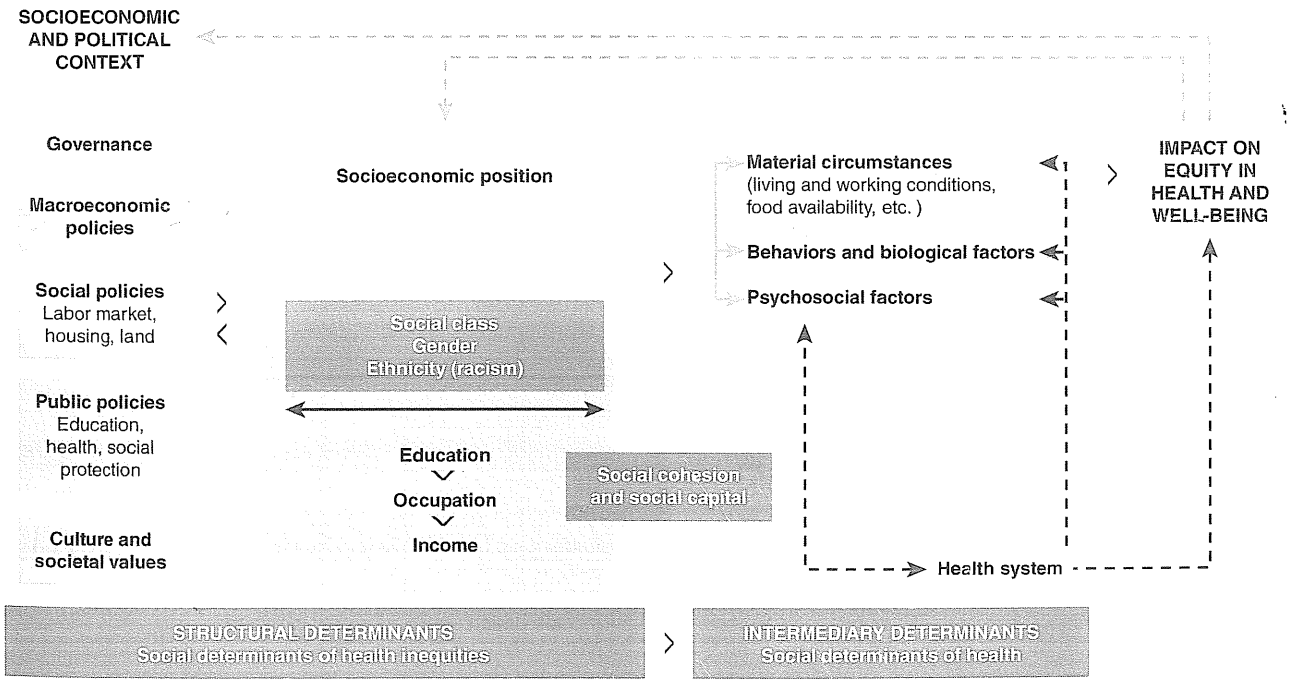


FIGURE 4-2 The Commission on Social Determinants of Health (CSDH) conceptual framework.

Reproduced from Solar, O. and Irwin, A. (2010). *A conceptual framework for action on the social determinants of health. Social Determinants of Health.* WHO Discussion Paper 2 (Policy and Practice), Geneva, Switzerland: WHO. http://www.who.int/sdhconference/resources/ConceptualframeworkforactiononSDH_eng.pdf (accessed 22 June 2017).

SDH). It includes the SDH—including state policies and programs—that *redistribute resources* and nurture relationships and systems that *close social differentials*. These structural determinants and the socioeconomic positions to which they lead, shown in the left-hand columns in Figure 4-2, thus have a central role as SDHE. They jointly shape intermediary SDH, such as material, behavioral, and psychosocial determinants. These factors largely act as SDH but may have a role in equity where they influence *differentials in exposure and vulnerability* to conditions that affect health or the social consequences of ill health, as discussed for the health system later in this chapter. The health outcomes of these conditions can themselves "feed back" on people's social position, such as by compromising employment opportunities or reducing income.

While previous models have noted the role of the health system in dealing with social determinants of health, this framework positions the health system as one of the *intermediary determinants*. It recognizes that health systems both reflect existing patterns of social inequality and provide a site from which to contest them (a topic discussed in more depth in a later section). The CSDH framework also recognizes the effect of globalization and global-level drivers on SDH at the national and local levels (also discussed later).

Policies and interventions that seek to improve equity may be targeted at SDH at both the structural and the intermediary levels: from the "micro" level of individual interactions (such as individual dietary practices), to the "meso" level of community conditions (such as neighborhood environments), to the broadest "macro" level of universal public policies (such as tax and investment policies), including in the global environment and in relation to the role and impact of private actors and corporations. Applying the framework entails assessing the distributional impact of actions and action across multiple areas of SDH. As shown in **FIGURE 4-3**, the CSDH framework identifies these distributional impacts at the level of impacts on social stratification, on differentials in exposure, on differentials in vulnerability to risks, and on the unequal consequences of illness.

FIGURE 4-3 The CSDH framework for tackling inequalities in health.

Reproduced from Solar, O. and Irwin, A. (2010). *A conceptual framework for action on the social determinants of health. Social Determinants of Health*. WHO Discussion Paper 2 (Policy and Practice), Geneva, Switzerland: WHO. http://www.who.int/sdhconference/resources/ConceptualframeworkforactiononSDH_eng.pdf (accessed 22 June 2017).

Across each of these dimensions, identifying and taking action on SDH to reduce health inequities may have the following benefits:

- Remedy health disadvantage among specific populations—as, for example, in SDH interventions for the Roma community, outlined in Exhibit 4-7
- Close health gaps between two groups, usually the worse-off and better-off groups, as intended in the work of community health workers in Guatemala to improve service uptake in poorer groups, described in Exhibit 4-7
- Address the social health gradient across the whole population—as, for example, is a policy intention of the various features of universal health systems described in later in this chapter

These approaches are not mutually exclusive, but rather may bring together action on different SDH at different levels. As discussed later in this chapter and in Exhibit 4-1, strategies that tackle one or more of these outcomes may be complementary, such as when additional measures for single mothers are embedded within general social protection schemes. Such action on SDH calls for input from multiple sectors, as explored later in this chapter.

Understanding the SDH that affect how different social groups access or experience universal interventions can point to specific additional measures that need to be integrated to close the gap or gradient. Such analysis, as a form of "equity proofing," can, for example, be integrated in health impact assessments (HIA) to check for the likely equity implications and consequences—both intended and unanticipated—of a particular action, policy, or intervention, and to recommend proactive measures to improve health equity (Simpson, Mahoney, Harris, Aldrich, & Williams, 2005).

In all of these models, applying an equity lens to SDH to identify and address these social determinants of health equity calls for robust evidence on the distribution of health and its determinants, and for monitoring and evaluation systems that contribute such evidence to policy decision making. Evidence on SDH often extends beyond familiar health indicators, and assessing changes in health gradients and across social features, areas, and time can be complex.

Solar and Irwin (2010) observe that there is a dearth of evidence, including data on impacts, to support policy action on SDH and inequities in health. Cochrane reviews of studies of tobacco control, for example, rarely assess the impact of policies or programs in relation to socioeconomic dimensions (Oxman, Lavis, Lewin, & Fretham, 2009). As noted earlier, the interventions are often multifaceted, combining different levels of SDH and sectors, relative to the often narrower biomedical/clinical health interventions. The former are context dependent, are delivered within a constantly changing health and social policy environment, and involve diverse disciplines (Oxman et al., 2009). While there is growing recognition of and research on these SDHE, further development of methods that take the complexity of such interventions into account is still needed, and funding for this research is still limited relative to that allocated for the biomedical sciences (CSDH, 2008). The CSDH (2008, p. 186) has noted that "action on SDH is best served through developing a rich and diverse evidence base." This chapter thus includes evidence from multiple disciplines and methodological traditions, ranging from analysis of repeated household surveys, to qualitative studies, policy analysis, studies of power relations, practice reviews, and system-level evaluations.

The conceptual frameworks discussed in this section also suggest that social processes and power differentials play an important role in the social hierarchies that stratify people and in acting on SDH that affect health equity, as exemplified in the case of indigenous people in **EXHIBIT 4-2.**

EXHIBIT 4-2 Understanding Systematic Discrimination Against Indigenous People as an SDH

Indigenous people in Australia (as in other countries) are not merely "disadvantaged citizens." The poverty and inequality in health that they experience reflect the association with systemic discrimination over centuries. Thus, addressing these issues is not simply a matter of provision of material or service inputs, but rather requires addressing ways to increase their control over their physical environment, their dignity, and their community self-esteem, and the matter of justice (Calma, 2007). Such systemic processes of discrimination and disempowerment cannot be simply understood as historical events reflected in poorer current health outcomes for indigenous people, but must be recognized as persistent in their social consequences and within current sociopolitical contexts, with continued negative impacts on health outcomes (Axelsson, Kukutai, & Kippen, 2016). The CSDH (2008) and the indigenous health research community have called for such effects of colonialism to be more explicitly incorporated into epidemiologic analysis and monitoring systems.

Health interventions and systems are thus not simply technical or biomedical in nature, but rather affect social power and status and reflect procedural justice, such as through decision-making processes that are transparent to, accessible to, and inclusive of the input of those affected by them. The next sections explore further how intervening on SDH to promote equity calls for institutions and processes that provide opportunities and spaces for disadvantaged and marginalized groups to engage in decisions that affect their health, that are responsive to need, and that recognize and deliver on health rights, as noted in the 2008 CSDH report: "Changing the social determinants of health and health equity is a long term agenda requiring sustained support and investment . . . recognising that . . . at the centre of this action should be the empowerment of people, communities and countries that do not have their fair share" (p. 23).

Integrating concepts of power into the analysis of SDH and into the responses to the resulting inequities in health both clarifies and complicates frameworks. Solar and Irwin (2010, p. 21) argue that while power is "arguably the single most important organizing concept in social and political theory," it is also contested and subject to diverse and often contradictory interpretations. It draws public health professionals into the sometimes less familiar terrains of social justice and rights–based approaches, of sociopolitical and systems theory, and of activism, discussed further in the chapter.

Relationships Between SDH, Gender Equality, and Human Rights

The conceptual frameworks highlighted earlier indicate that SDH intersect with the distinct but linked concepts of gender and human rights, particularly when applying an equity lens. While sex is a biological determinant, gender refers to the socially constructed roles, rights, responsibilities, and limitations assigned to women and men, boys and girls—which often privilege male power or characteristics (WHO, 2011). These aspects of gender are socially constructed and amenable to change, as an SDH that leads to *differentials in exposure and vulnerability* to conditions that affect health and thus health equity (Sen & Ostlin, 2011).

Gender norms, roles, and relations can affect (health) risk and vulnerability, health-seeking behavior, and health outcomes for men and women of different ages and social groups, including through stereotypes, discrimination, and the gender-based division of labor (Sen & Ostlin, 2011; WHO, 2011). Gender norms and relations are a persistent basis of the social hierarchies and stratification mentioned earlier, intersecting with social class, ethnicity, education, occupation, and income; influencing socioeconomic position and the distribution of other SDH; and being influenced by the wider socioeconomic and political context, culture, and societal norms and values (Sen & Ostlin, 2011). The Definitions box summarizes the related concepts of *gender equality* and *gender equity*. Within universal policies such as "health for all," the "all" are not the same. Gender-related differences that lead to inequities in health arise from the different health needs and challenges that men and women face across their life course and the ways in which they intersect with other SDH. Gender-related differences exist in a range of SDH, including living and environmental conditions, employment and income opportunities, and control over decisions about and uptake of health services (WHO, 2011). Gendered norms, behaviors, and socially constructed roles intersect with other SDH to generate differential social and health outcomes.

Many of these differentials derive from women's status in society, and their control over a range of areas affecting health, including over their own bodies, their reproductive health, and their working conditions and income (for example, see **EXHIBIT 4-3**). Women are at greater risk of physical violence and sexual abuse and face deficits in protection in law or its enforcement (Sen & Ostlin, 2011). In addition, female, lesbian, gay, bisexual, transgender, and intersex (LGBTI) people risk poorer health outcomes than males or people who are not LGBTI because of gender power relations (Sen & Ostlin, 2011).

DEFINITIONS

- *Gender equality* refers to women and men having equal conditions and opportunities to realize their rights and potential to be healthy, to contribute to health development, and to benefit from the results. Gender inequality puts the health of women and girls at risk globally. Improving gender equality in health enables the improvement in the health of women.
- *Gender equity* refers to fairness and considers women's and men's different needs to achieve gender equality. It implies the different treatment needed to ensure equality of opportunity. Both gender equality and gender equity are needed to achieve health equity (Sen & Ostlin, 2011; WHO, 2011).

EXHIBIT 4-3 Child Marriage and Its Gendered Health Effects

Child marriage is a union (official or not) of two persons, at least one of whom is younger than 18 years of age. It is driven by gendered values and beliefs about girls' roles and contributions, affects girls and boys differently, and is more prevalent among girls. In Niger, for example, 77% of women age 20 to 49 were married before age 18, compared to 5% of men in the same age group. Collecting data on such unions poses a challenge, because child marriages are often not registered. However, worldwide, more than 700 million women in 2014 were married before age 18, and about 250 million before age 15, with the highest rates found in South Asia and sub-Saharan Africa. There are educational, regional, urban–rural, and wealth differences in this practice: In Malawi, nearly two-thirds of women with no formal education were child brides compared to 5% of women with secondary or higher level schooling; in Amhara, northern Ethiopia, the rate of child marriage is 75%, compared to 26% in Addis Ababa; and girls in the poorest quintile are 2.5 times more likely to marry in childhood than those in the wealthiest quintile.

Girls who are married before age 18 experience greater negative impacts on physical and mental health and well-being than do boys in this situation, primarily due to complications from early pregnancy and childbearing, increased risk of and vulnerability to human immunodeficiency virus (HIV) and other sexually transmitted infections, and gender-based violence and discrimination. Complications during pregnancy and childbirth are the second leading cause of death for 15- to 19-year-old girls globally. Adolescent mothers are often socially isolated from family, friends, and other sources of support, such as health services; have limited opportunities for education and employment; and may be less empowered to break the cycle of poverty due to their lower levels of education. Early maternal age affects infant mortality and growth, compounding intergenerational inequality. Furthermore, unregistered child marriages may mean that the child's birth is also unregistered, potentially affecting the child's access to health, social, and educational services (UNICEF, 2014, 2016; WHO, 2014; WHO Regional Office for Europe [WHO Europe], 2016).

In terms of reducing health inequities,

> [because] of the numbers of people involved and the magnitude of the problems, taking action to improve gender equity in health and to address women's rights to health is one of the most direct and potent ways to reduce health inequities and ensure effective use of health resources. Deepening and consistently implementing human rights instruments can be a powerful mechanism to motivate and mobilize governments, people and especially women themselves. (Sen & Ostlin, 2011, p. 74)

International human rights instruments provide a framework for universality and a legal obligation for states to ensure policies that support conditions and opportunities for health for all (Braveman & Gruskin, 2003). Human rights–based approaches thus raise the relevance of acting on SDH for improved health, so as to meet the 1948 Universal Declaration of Human Rights Article 25 provision: "Everyone has the right to a standard of living adequate for the health and well-being . . . including food, clothing, housing and medical care and necessary social services" (United Nations, 1948).

A human rights–based approach also draws attention to the SDH that affect health equity, to ensure the "right to the enjoyment of the highest attainable standard of health . . . without distinction of race, religion, political belief, economic or social condition" for all, as provided in Article 12 of the 1966 International Covenant on Economic, Social and Cultural Rights (ICESCR) (United Nations, 1976). The ICESR General Comment 14, in addition to identifying universal access to specific SDH for the whole population, identifies the core state obligations in relation to health as ensuring *nondiscriminatory access* to health facilities, goods and services, *especially for marginalized groups* (United Nations, 2000). The right to health provides for claims by people as rights bearers to key SDH, including health care, and its achievement depends on the realization of these entitlements and freedoms (Gesellschaft für Internationale Zusammenarbeit [GIZ] & WHO, 2011a). While some rights violations, such as access to safe water, are measurable and have clear health consequences, there is some debate on what the right to "the highest attainable standard of health" means in practice. It has been argued that one dimension of this is closing avoidable inequalities in health within and across countries (EQUINET, 2012).

Rights-based approaches in health imply not only intervention on intermediary SDH, but also processes that include participation, information sharing, and accountability in setting priorities, planning and design, and implementing and monitoring policies and programs that are set in more structural SDH. They imply that states and others charged with duties

The United Nations Human Rights-Based Approach (UNHRBA, 2003) to development has as its purpose to assist UN agencies in mainstreaming human rights into their activities and programs within their area of work with the expected outcome of realization of one or several human rights (e.g., the right to health). Human rights principles should guide programming in all sectors, and include capacity building of rights holders to make their claims and of duty bearers to meet their obligations (UNHRBA, 2003).

have the resources and capacities to meet their obligations; and that social groups—particularly vulnerable groups—have the information and capacity to claim their rights, with access to redress mechanisms such as human rights commissions, policy reviews, audits, and courts to pursue violations.

Nevertheless, the resource constraints facing states, particularly in low-income countries, also generally imply a principle of progressive realization of the right to health (and its determinants)—that is, to move as quickly and effectively as possible toward their achievement. ICESCR General Comment 14 refers to core obligations that require immediate action versus obligations that can be progressively realized, supported by measures to show constant progress (United Nations, 2000). States need to demonstrate that they are taking deliberate, concrete, and targeted steps towards realizing these health and SDH rights, to put all appropriate and available means in place for this progress, and to monitor and report on their implementation against agreed benchmarks (GIZ & WHO, 2011b).

There is an interaction between gender and human rights frameworks in addressing SDH. Human rights principles of equality, participation, and nondiscrimination applied in addressing SDH address gender inequalities and gender equality not only as an SDH, but also as a human right. Addressing gender inequalities is, further, essential to realizing human rights, including the right to health (WHO, 2011). Gender mainstreaming as a strategy thus applies a human rights–based approach, in analyzing the impact of gender norms, roles, and relations on rights to health, and in implementing measures to address rights violations and institutionalize gender equality, in a manner that integrates the participation of affected women (WHO, 2011).

Hence, despite their differences in focus, SDH, gender equality, and human rights frameworks share some common features: All are explicitly guided by an ethical (normative) foundation that values and promotes procedural justice; all identify health outcomes as the result of wider social and material conditions (and seek to generate evidence and analysis on this relationship); and all recognize the role of social processes and power differentials in creating health inequities. Moreover, all three see the state and participation of affected populations as central in the response to health inequity and action on the SDH, through actions across numerous sectors, including the health sector.

Addressing SDH Through Intersectoral Action and Health in All Policies

The diversity of SDH noted in the frameworks introduced earlier in this chapter implies that actions on SDH call on many sectors. The concept of *intersectoral action for health* was formally introduced at the 1978 International Conference on Primary Health Care (PHC) in Alma-Ata. The PHC approach explicitly identified the need for both comprehensive health services and joint action with other sectors to tackle the SDH and root causes of poor health (Public Health Agency of Canada [PHAC], 2007), with subsequent global processes further stressing the importance of dialogue and joint action with other sectors (CSDH, 2008)

Many SDH lie outside the remit of the health sector (CSDH, 2008). For example, a global review of evidence on the determinants of diabetes identified that improving health outcomes for this condition involves the following measures: (1) limiting the availability of unhealthy food and environments; (2) tackling the obesogenic environment through improving urban infrastructure to promote physical activity; and (3) reducing exposure and addressing increased vulnerability among certain groups by improving

DEFINITION

Intersectoral action refers to processes in which "the objectives, strategies, activities, and resources of each sector are considered in terms of their implications and impact on objectives, strategies, activities, and resources of other sectors." It is advanced as a means for overcoming policy fragmentation; as a way to plan, implement, and monitor service delivery; and as a means to address "upstream" the determinants of health (Loewenson, 2013a, p. 8).

screening and access to and uptake of health care (Whiting, Unwin, & Roglic, 2010). The health sector thus needs to cooperate with other sectors to improve health outcomes, as demonstrated in **FIGURE 4-4** in regard to the actions needed to tackle the health burdens from exposure to air pollution.

Such intersectoral action to address SDH can be located as a shared goal across government, with "Health in All Policies" (HiAP) being one such approach. A HiAP approach is driven from within government as a whole, linking specific programs and measures to wider government policy agendas

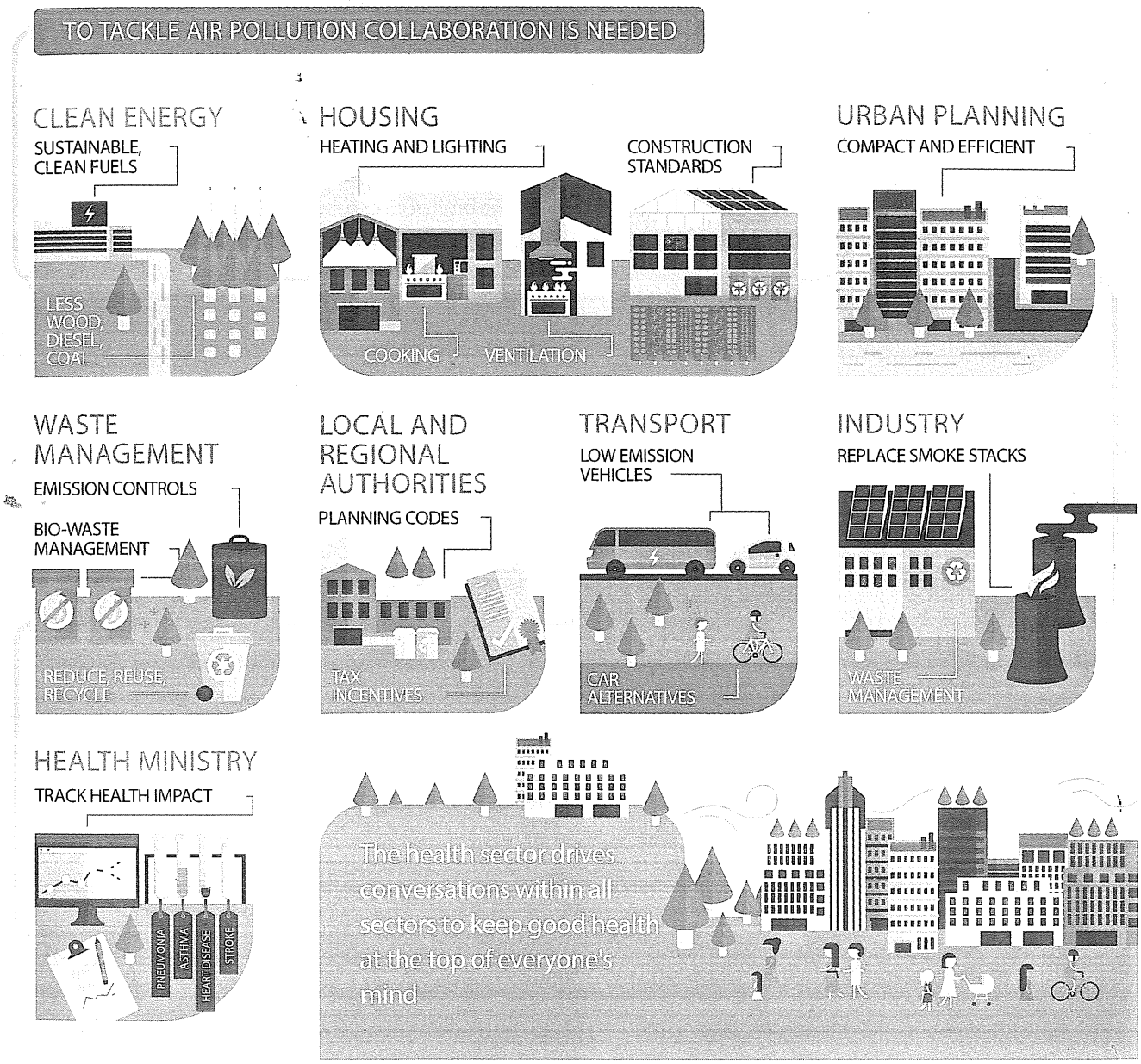


FIGURE 4-4 Intersectoral collaboration on air pollution.

Reproduced from WHO. (2015). *What is health in all policies?,* Infographic on air pollution. http://who.int/social_determinants/publications/health-policies-manual/HiAP_Infographic.pdf?ua=1 (accessed 19 May 2017).

DEFINITION

Health in All Policies is an approach to public policies across sectors that systematically takes into account the health and health systems implications of decisions, seeks synergies, and avoids harmful health impacts, with the goal of improving population health and health equity. A HiAP approach is founded on health-related rights and obligations.

(Ollila, Baum, & Peña, 2013, p. 6)

(Shankardass, Solar, & O'Campo, 2012). While formally articulated as policy concepts from the 1970s, HiAP and intersectoral action for health have their roots in the early history of public health and "healthy public policy." HiAP builds on experiences of intersectoral action and health promotion, and has been given a greater international profile since 2000 (Friel, Harris, Simpson, Bhushan, & Baer, 2015; PHAC, 2007).

EXHIBIT 4-4 provides an example of HiAP in South Australia, located within the overall state strategic plan. Applying HiAP calls for information systems and strategic review involving all relevant sectors to gather evidence and evaluate how joint actions are affecting the distribution of SDH as well as the social gaps and gradients in health, so as to adopt appropriate responses (Loewenson, 2013a; WHO, 2013a).

As noted in Exhibit 4-4, intersectoral action calls for measures to build collaboration and coordination across sectors, often departing from the administrative, budgetary, and functional siloes that exist within states. It involves whole-of-government approaches, which lever action across all levels and sectors of government, and whole-of-society approaches for public outreach, including through parliaments/legislatures, civil society, and the private sector (Delaney et al., 2016; WHO Europe, 2013). A review of experiences in more than 15 countries identified key measures for the successful implementation of intersectoral action, shown in **EXHIBIT 4-5** (PHAC, 2007; Rasanathan, 2011).

The HiAP approach and the implementation steps in Exhibit 4-5 can be applied to embed health equity as a goal across all relevant national policy, law, and

EXHIBIT 4-4 The South Australian Approach to Health in All Policies

HiAP in the South Australian government, as adopted in 2008, was developed as a central process of government, rather than one run by and for the health sector. It was integrated in the implementation of the South Australian Strategic Plan, which aimed to improve prosperity and well-being, foster creativity, build communities, and sustainably expand opportunity. The approach sought to better utilize social, economic, and environmental levers to influence population health, and in turn to contribute to achievement of the overarching government vision for South Australia as articulated in the strategic plan. HiAP is thus deliberately and strategically positioned as a central process of government, rather than a process run by the health sector to achieve solely its objectives. A range of agencies use HiAP in partnership with South Australian Health as a mechanism for achieving their own goals, aligned to the objectives and related targets of the strategic plan. The implementation of HiAP is supported by central government, in partnership with the health sector.

The 2011 South Australian Public Health Act provides for the systematic integration of HiAP approaches in government functions and for mechanisms for embedding health considerations in government decision-making processes. The act mandates use of HiAP in public health planning by local municipalities and in health impact assessments and any other measures that they use, such as a health lens analysis. Health lens analysis builds on traditional methods for health impact assessment and incorporates additional methods used by other sectors, such as economic modeling. Such analyses have, for example, focused on water sustainability, regional migrant settlement, digital technology access and use, healthy weight, and active transport. A small HiAP unit was established within South Australian Health to facilitate health lens analysis and sustain the partnership with other government agencies in applying HiAP to their targets (Bucket, Williams, & Wildgoose, 2011; WHO, 2013a).

EXHIBIT 4-5 Measures for Steps Necessary for Successful Implementation of Intersectoral Action for Health

1. Create a policy framework and an approach to health that are conducive to intersectoral action.
2. Emphasize shared values, interests, and objectives among all partners and potential partners.
3. Ensure political support, building on positive factors in the policy environment.
4. Engage key partners at the very beginning.
5. Ensure appropriate horizontal linking across sectors and vertical linking of levels within sectors.
6. Invest in the alliance-building process by working toward consensus at the planning stage.
7. Focus on concrete objectives and visible results.
8. Ensure that leadership, accountability, and rewards are shared among partners.
9. Build a stable team of people who work well together, with appropriate support systems.
10. Develop practical models, tools, and mechanisms to support implementation of intersectoral action.
11. Ensure public participation through education and awareness raising of SDH and intersectoral action.

Reproduced from WHO. World Conference on Social Determinants of Health. Closing the Gap: Policy into Practice on Social Determinants of Health. Retrieved from: http://www.who.int/sdhconference/Discussion-paper-EN.pdf

programs, when specific focus is given to those SDH that have a role in closing the gap or gradient. For example, in 2007, a Norwegian parliament whole-of-government approach aimed to reduce social inequalities in health in 2007–2017 by "leveling up" across the social gradient. The strategy linked efforts to reduce social inequalities in health to government policy initiatives to improve employment, welfare, and inclusion, and to support early intervention for lifelong learning (Norwegian Ministry of Health and Care Services, 2007). Another example of such a "whole-of-government" approach in Mozambique is described later in Exhibit 4-12.

While there may be technical evidence or consensus on the relevance of specific SDH to health outcomes, not all countries have the high-level leadership support, policy space, or institutional systems to support such whole-of-government approaches to cooperation across sectors. Where this is the case, intersectoral action may be built by the health sector itself collaborating with one or more sectors to support the shared goals of both sectors. For example, education measures that support secondary school completion rates for girls, such as those described later in Exhibit 4-9, contribute both to improved education outcomes and to improved adolescent health, with longer-term health, socioeconomic, and well-being gains for girls—and their future children—extending into adulthood (Loewenson, 2013b).

These approaches help to build the confidence in, relationships for, and systems to support intersectoral action for health. Tackling health inequities, and particularly those that are affected by structural determinants, often demands the deeper and more sustained levels of collaboration through the whole-of-government approaches described earlier, as found in a review of experiences of 19 countries in Africa, Southeast Asia, and the Western Pacific (WHO, 2013a). In one such experience, described in **EXHIBIT 4-6**, Vietnam sought to improve road safety and to alleviate traffic congestion, both of which had the potential to have positive impacts on health and health equity.

Advancing intersectoral action calls for governance arrangements and systems to design and implement coherent multisectoral and cross-sectoral policies on SDH. This is often a challenge, particularly when health professionals are perceived to be overlooking other sectors' goals and challenges and drawing resources *from* other sectors *to* a health sector agenda, rather than as efforts to mutually improve each sector's policies (Rasanathan, 2011). The goals of other sectors should thus be used to orient analysis and explore areas of mutual interest across sectors. WHO's SDH Sectoral Briefing Series (covering housing, education, transport, energy, and social protection) provides further information

EXHIBIT 4-6 Multisectoral Collaboration Through the National Helmet Law in Viet Nam

The motorcycle is the primary mode of transportation in Viet Nam and contributes to more than half of all road traffic fatalities (Passmore, Tu, Luong, Chinh, & Nam, 2010). Passengers, particularly children, are vulnerable to injury due to widespread lack of helmet use. Despite helmet legislation since 1995, with amendments in 2000, 2001, and 2003, the National Traffic Safety Committee charged with implementation of this law faced challenges due to legislative loopholes. A 2007 law sought to close these loopholes by requiring all riders and passengers to wear helmets on all roads without exception and by increasing penalties tenfold. Although 50,000 helmets were distributed to low-income families nationwide, more loopholes were identified after introduction. For example, no reference was made to the correct use of helmet wearing, and the existing legislation meant neither children younger than 16 years of age nor adults carrying them could be fined. These legislative loopholes were subsequently addressed and attention given to barriers to effective helmet use, including improved availability and quality of helmets for the climate, raising public awareness, and changing beliefs about the impact of helmet use. Multisectoral collaboration was built across government agencies and with key nongovernmental organizations and the private sector. This resulted in three national mass-media campaigns and distribution of free helmets to school-age children sponsored by private companies. Monitoring showed helmet-wearing increased from less than 30% to more than 95%, with this change estimated to have saved more than 1,500 lives and prevented almost 2,500 serious injuries.

This example illustrates an approach to policy change backed by strong political support, integrating legislative, research, and media work and strategic alliances. There was cross-sectoral support because the actions were seen to yield benefits for a range of sectors, including road safety, alleviation of traffic congestion, improved health, and reduced costs to the state and families from serious injury and potential loss of income. Focusing distribution of helmets on low-income families aimed to support equity by facilitating compliance with the law among those who were least able to afford a helmet, but most reliant on motorcycle travel (Nguyen, Passmore, Cuong, & Nguyen, 2012; Passmore, Tu, Luong, Chinh, & Nam, 2010; Passmore, Nguyen, Nguyen, & Olivé, 2010; WHO, 2013a).

to support such collaboration with sectors outside health, such as in supporting transport authorities' banning of lead and sulfur in gasoline as not only a health-promoting measure, but also as a contributor to improved air quality and a sustainable environment (WHO, 2017a).

Implications for Health Systems and Services

As further elaborated in *The Design of Health Systems* chapter, effective health services are a determinant of population health, contributing to reducing mortality and increasing life expectancy, particularly through preventive services and health promotion (Loewenson & Whitehead, 2012; WHO Regional Office for Europe [WHO Europe], 2011). They encompass various functions, including stewardship, resource mobilization, financing, and service delivery, and involve a network of public and private organizations, institutions, and resources (WHO Europe, 2011).

Health systems not only provide individual- and population-level services that position them as an intermediary SDH, but, as outlined earlier in this chapter and in Figure 1.1, they can also influence the policies and coordinate with the actions of other sectors to address SDH, thereby providing a site from which to contest social inequalities (Solar & Irwin, 2010; WHO Europe, 2011). Health services and institutions can address differences in exposure and vulnerability, take a leadership or facilitating role in intersectoral action, and mediate or mitigate the financial, social, and physical consequences of illness in people's lives.

This role of the health system in addressing both disease and its underlying SDH is consistent with the application of the PHC approach as an organizational strategy and an underlying philosophy. Within the healthcare system, PHC requires the provision of comprehensive, integrated, and appropriate health services, emphasizing prevention, promotion, and the role of primary care and the role of the health sector in intersectoral action for health (Gilson, Doherty, Loewenson, & Francis, 2008). While past experience of the application of PHC has produced mixed outcomes, evidence of its potential to improve health equity—compiled, for example, by CSDH—has sustained and increased calls for its implementation (Gilson et al., 2008).

There are a range of ways that health systems can achieve positive outcomes and influence the distribution of health and well-being, summarized in **FIGURE 4-5** overleaf. In the figure, the solid arrows show drivers of health inequity, whereas the dotted arrows show how the health system can mitigate these effects or promote health equity. Health systems can promote health equity when they tackle the physical and social environments that affect differential exposure and vulnerability to ill health, including through intersectoral action. They can reduce social gaps and gradients in health by influencing how health services perform, how different social groups experience the services they receive, how widely their uptake or contact translates into effective coverage and care, and whether health funding protects against impoverishment when people fall ill (Gilson et al., 2011).

In a rights-based approach, health systems can provide space for people to exercise their rights, to have an informed say in decisions and actions on health, and to hold the system accountable for its performance. Health systems directly influence other SDH, such as local employment and economies, gender equality, and organizational policies, by their own behavior and organization, in the way they help patients to claim welfare benefits; provide rehabilitation to enable people to keep jobs; manage personnel; procure inputs locally; and champion or facilitate political support to introduce or sustain actions that address SDH and promote health equity (Loewenson & Whitehead, 2012).

While the manner and extent to which these measures are implemented depends on the specific country and sociopolitical contexts, some principles and areas of learning apply more broadly in terms of how the health system implements its role in SDH and health equity.

Investing in Primary Health Care-Oriented Services at the Local Level

Addressing health equity and SDH implies that health systems will pay attention to and direct resources toward health promotion and prevention of disease

DEFINITION

Health systems encompass all the activities whose primary purpose is to promote, restore, or maintain health. They comprise the public and private organizations, institutions, and resources that aim to prevent disease, promote health, and provide health care, and they shape wider societal norms and values (Gilson, Doherty, & Loewenson, 2011).

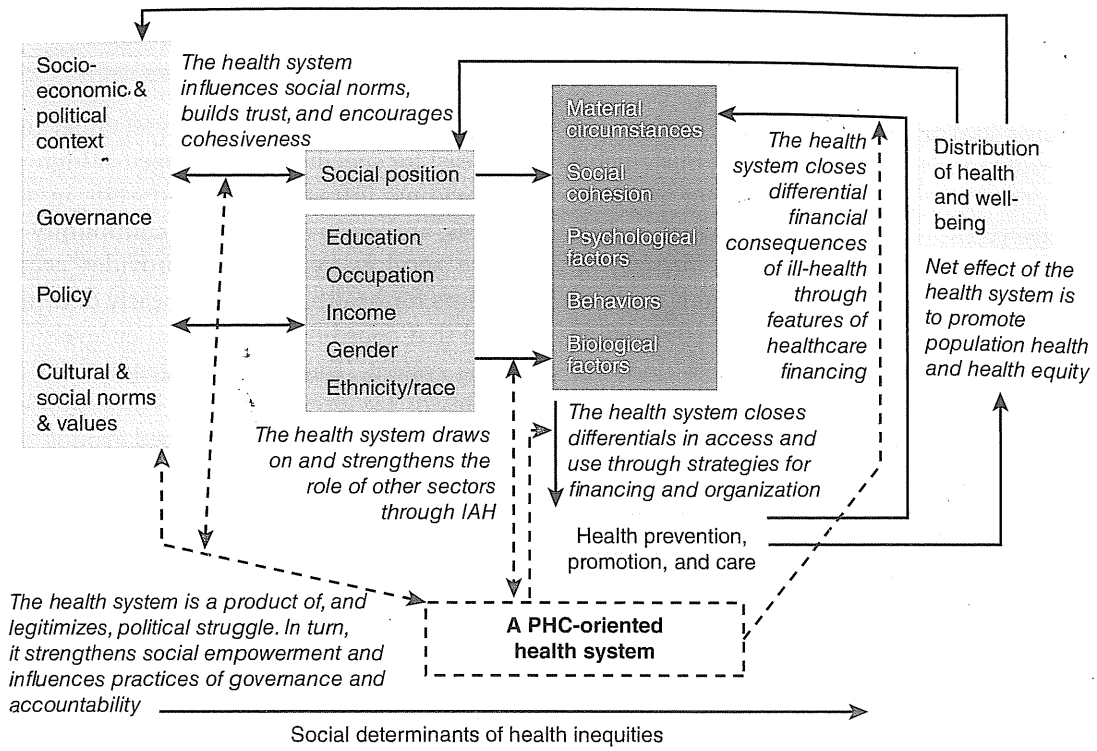


FIGURE 4-5 The health system as a social determinant of health.

Reproduced from Gilson, L., Doherty, J., and Loewenson, R. (2011). 'Challenging inequity through health systems', in J. H. Lee and R. Sadana (Eds.). *Improving equity in health by addressing social determinants*. Geneva, Switzerland: World Health Organization (WHO). http://apps.who.int/iris/bitstream/10665/44793/1/9789241503037_eng.pdf (accessed 22 June 2017).

at both the individual and population levels, rather than focusing exclusively on individual curative or emergency care. Doing so requires investment in community- and primary care–level services and activities, to open up opportunities for engagement with civil society, communities, and other local services or interventions needed by marginalized groups (Gilson et al., 2008). It is at this level and in this kind of local interaction that many of the SDH and access barriers affecting service uptake can be most directly recognized and addressed, including cost, social, gender, and cultural and other barriers and discrimination; lack of information and knowledge; lack of voice or power; and unresponsive or poorly oriented service providers. This is especially the case if services are to reach and address the health needs of the most marginalized groups (Gilson et al., 2011).

As noted earlier, for health systems to address SDH successfully, they also need to provide public health leadership for and work with other sectors to address the wider social and economic determinants of health, so that people do not repeatedly need treatment after returning to the same conditions that made them ill. This is not simply a matter for those working in community health or health promotion. Rather, it is affected by the continuity and comprehensiveness of the healthcare system as a whole: how well it is able to link preventive, treatment, and rehabilitation services; cover immediate- and longer-term mental, physical, and social health needs; and coordinate pathways from primary care to referral to secondary and specialist services around individuals and populations (Gilson et al., 2008, 2011; Loewenson & Whitehead, 2012; Training and Research Support Centre [TARSC], 2014). It calls for leadership, communication, and facilitation capacities; for the decision-making space and resources to make and manage links with the public and other sectors; and for the political and social awareness and support for health personnel when they act on public health needs (Gilson et al., 2008; Loewenson, 2016; WHO, 2008).

Organizing Equitable and Universal Provision and Financing

In a universal system, everyone in a country should be able to access the same range of services on the basis of their need and pay for these services on the basis of their income. Universal health systems are generally publicly funded largely through general taxation or mandatory insurance and provide care for free or at very low cost at the point of delivery. To support equity, wealthier (and relatively healthy) people cross-subsidize the use of health care by poorer people, who are also more

likely to be ill. This transfer of resources from wealthier to poorer groups in redistributive health systems can also assist to close gaps in income and living standards between poorer and wealthier groups (Mackintosh, 2007). Universality is a key goal of the UN Sustainable Development Goals, expressed as achieving universal health coverage (UHC)—a system in which all people and communities can use the promotive, preventive, curative, rehabilitative, and palliative health services they need, of sufficient quality to be effective, while also ensuring that the use of these services does not expose them to financial hardship.

How countries achieve this goal varies across settings and may change over time. Many countries have funded health from general tax revenues or national mandatory insurance, in large pooled funds that allow for both cross-subsidies and the range of promotion, prevention, and care approaches necessary for addressing the social determinants of health equity. Currently, new prepayment approaches are being explored to secure adequate public funding, including for health promotion, taking into account not only how progressive they are, but also how they will impact on the goods, services, and behaviors that affect health. Such innovative financing sources include taxes on financial transfers, air travel, high-sugar products, tobacco, and alcohol, which may also be earmarked for specific purposes. In situations where formal and informal private payments for health services have risen, especially when arising as a result of inadequate or falling public funding, there are challenges for how to organize private payments into the forms of pooled prepayment that support universal systems and health equity and that invest in areas of public health that have less immediately perceived personal benefit (WHO, 2005). Organizing PHC-oriented, equitable, and universal health systems is not only a matter of how money is raised. It is also affected by whether resources and commodities are allocated according to need and invested in addressing social and service barriers to coverage, and whether there are mechanisms, such as health technology assessment, that bias public spending toward services with proven cost-benefit (Loewenson & Whitehead, 2012). Moreover, it depends on whether there is a motivated, competent health workforce deployed to areas of health need, trained and supported to implement actions on SDH and health equity.

Addressing Barriers to Equity *Within* Universal Policies

As noted earlier, policies for universal coverage do not necessarily lead to equity of access or impact on the SDH that affect uptake of care. Additional measures may be needed. Some measures for such "leveling up" have already been mentioned, such as ensuring that services are free at point of care, either universally, or at least for specific disadvantaged or high-need groups; providing infrastructure and staff in under-served areas; and ensuring a strong community and primary care services system that provides accessible entry points for health promotion, early detection, and care and that coordinates use of other levels of the health-care system. There may be demand for specific subsidies or tax exemptions for commodities consumed or used more by disadvantaged groups, such as basic foods. However, not all of the interventions are technical or on the supply side. Many address determinants that discourage uptake of services, such as by working with indigenous health systems and local civil society organizations (CSOs); providing joint entry points or working as multidisciplinary teams across health and other sectors, together with local political and community leaders and volunteers; creating entry points for health actions in settings (e.g., schools, workplaces, communities, marketplaces, areas) that people frequent; and sharing information and building a more participatory culture to involve community members in decisions and actions on their priority health needs (Gilson et al., 2011; Loewenson & Simpson, 2014). **EXHIBIT 4-7** provides some examples of programs that address the SDH affecting equity in health systems.

Actions such as those described in Exhibit 4-7 can strengthen, or protect, equity-promoting features of health systems and are often connected with wider struggles for social justice and transformation (Rede Brasil de Direitos Humanos, n.d.). For example, wider struggles for democracy in southern Africa set the political basis for post-independence comprehensive PHC approaches (EQUINET SC, 2007), while struggles for participatory democracy in Brazil shaped the entitlements and governance arrangements established in the Brazilian universal health system (SUS) in 1998 (Cornwall & Shankland, 2008). A study of primary care in 31 European countries found that sustained social support for government's responsibility for welfare provision was important to enable the longer-term reforms that strengthened the comprehensiveness and equity of primary care services (Kringos, Boerma, Zee, Van der Zee, & Groenewegen, 2013). In the United Kingdom, a redistributive publicly funded National Health Service has been sustained over more than 60 years by social and cross-party support (Pennington & Whitehead, 2014). In in other countries, rights-based approaches have been used to clarify state duties and public entitlements and responsibilities (Loewenson & Simpson, 2014).

EXHIBIT 4-7 Addressing the SDH That Affect Equity in Health Systems

In Spain, the *Health Promotion among Navarre Ethnic Minorities* program aims to reduce health inequities by improving the health of the Roma community in one area; the Roma are one of Europe's most disadvantaged social groups. Efforts are being made to design and implement prepayment schemes and to raise awareness with the Roma community about their health entitlements. Issues raised by the Roma community are integrated into training for health workers. The health information system carries out health equity surveillance, including for Roma populations, and the evidence is used to review and share practices across sectors and across countries. People from within the Roma community are trained as mediators and act as peer educators and as a liaison between the community and the central health, social, and education services. These mediators play a key role in documenting the health history of families in the area covered and drawing up a health plan in cooperation with the appropriate service providers. They highlight areas in which they need more information or education, as identified through the Roma associations—for example, on outbreaks of communicable diseases or issues related to lifestyle, life transitions, chronic diseases, and prevention. Staff from the relevant agencies meet once a year to incorporate additional items into the annual training program (Perez Jarauta, Goya Arive, & Merino Merino, 2010).

In England, *health champions*, local people trained by a U.K. nongovernmental organization, work with others in their communities to improve health. Health champions work with primary care personnel on health actions in the community; visit schools and community centers and bring local community members to health meetings; link local networks, knowledge, and experience with the practice knowledge and resources; use culturally relevant methods to gather local people to work with general practice staff; and explain to other patients how to make best use of the facilities and services provided. Health champions are reported to have improved input to local commissioning decisions, to have set up social and support groups for young mothers and for people with chronic conditions, to have improved individual and community literacy on prevention initiatives such as immunizations, and to have supported the use of appointment guides and other practice tools, especially for those persons for whom English is a second language. Their work is reported to have led to service and quality improvements (Pennington & Whitehead, 2014).

In rural Guatemala, *promotoras* (community health workers) have supported health service access and uptake. Low literacy rates, high rates of poverty, and gender inequalities impact on the uptake of child health services by indigenous Mayan women in the highlands of Guatemala. Indigenous leaders within the community—usually women who understand the local dialect and culture—have been trained as *promotoras*. The training is culturally adapted and recognizes local experience and environments. It includes space for the community to teach the teachers, such as on knowledge about the use of folk medicine to treat common ailments, while the *promotoras* are given information and skills to improve and manage basic health issues. An evaluation found these community health workers have had a positive impact on health and well-being, and the authors suggested that this experience may be relevant to meeting the health needs of immigrant populations in the United States.

Another paper describes how a needs assessment by the Organization for the Development of Indigenous Maya found diabetes to be a priority concern in indigenous communities. In 2012, the Organization for the Development of Indigenous Maya worked with community health workers trained as diabetes health promoters linked to primary care. Each worker had a caseload of 15–20 patients with whom they held a weekly diabetes club meeting, providing the attendees with information on self-management and group exercises. The community health workers also conducted weekly home visits and preconsults in the clinic to monitor each patient's progress and discuss specific challenges, create goals, and tailor exercise and nutrition plans. A significant decrease was found in mean blood glucose levels between baseline and follow-up in the people involved (Amerson, 2013; Micikas et al., 2015).

In recent decades, neoliberal globalization-related economic policies have dominated health system development in many countries. Given a more individualistic and consumerist society combined with conflicting political forces and values, these policies have challenged, fragmented, and weakened the universality and equity of health systems (Gilson et al., 2011; Mackintosh & Koivusalo, 2005). Thus, acting on SDH increasingly demands action to build public, professional, and political support, while also raising the role of social agency and power as a social determinant of health equity, as discussed further in the next section.

Social Exclusion, Social Agency, and Power as a SDH

As noted earlier in this chapter, people attain different positions in the social hierarchy, often characterized

by their social class, educational achievement, occupational status, and income level, or based on gender. Socioeconomic position can derive from the following sources:

- Resource-based measures, referring to material and social resources and assets, including income, wealth, and educational credentials, as well as poverty and deprivation
- Prestige-based measures, including the level and quality of access to and consumption of goods, services, and knowledge; occupation; and education (WHO, 2016)

Beyond resources and prestige, stratification arises due to discrimination on social factors such as race, gender, color, sex, language, religion, political or other opinion, national or social origin, or property (WHO, 2016). As social beings, humans need to feel valued and appreciated, and to derive meaning from and exercise a degree of control over their work and life conditions (AIHW, 2012). These drivers of social position are linked. Material deprivation generates social exclusion and stigma. Social power affects the ability people have to influence and make choices over health inputs and to use these inputs to improve their well-being (EQUINET SC, 2007). These factors and their role in stratification and power are summarized in **FIGURE 4-6**.

Social exclusion—and, conversely, social cohesion—has grown in profile as a conceptual lens through which to view problems of inequality, poverty, and disadvantage. Social exclusion has the following characteristics:

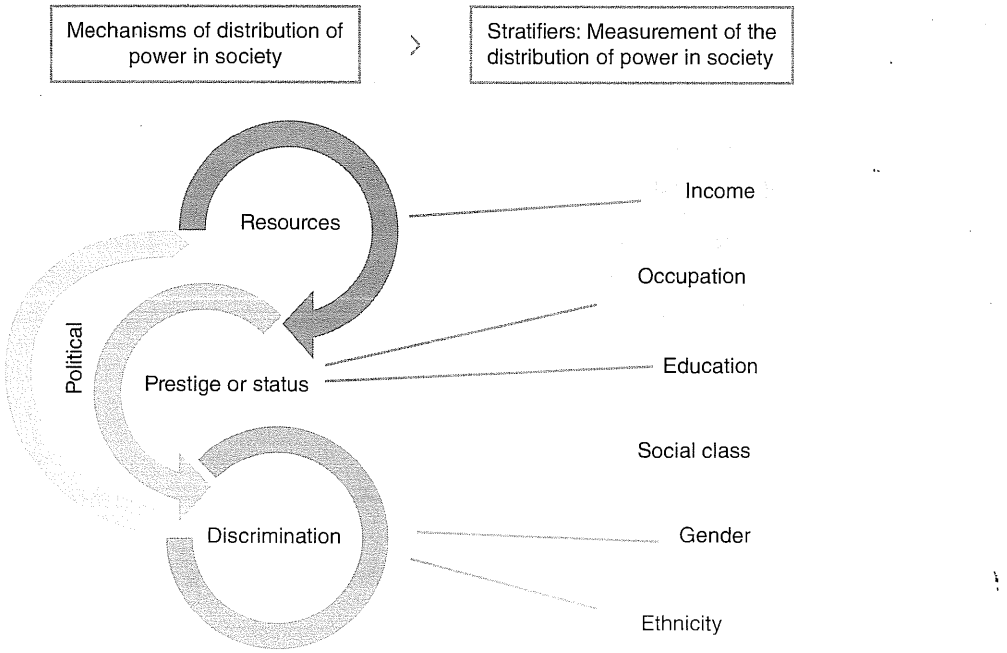


FIGURE 4-6 Mechanisms of distribution of power and their stratifiers.

Reproduced from WHO. (2016). *Innov 8: The Innov8 approach for reviewing national health programmes to leave no one behind*, Geneva, Switzerland: WHO http://apps.who.int/iris/bitstream/10665/250442/1/9789241511391-eng.pdf?ua=1 (accessed 22 June 2017).

DEFINITION

Social cohesion refers to the mechanisms and perceptions that exist in a society regarding social integration across various differentials and for confronting discrimination. It affects the sense of belonging within society, together with features of trust, participation, and reciprocity (WHO, 2016). This concept is applied differently in different regions, contexts, and communities. The European Commission's (2016) concept of "active inclusion" means that every citizen, including the most disadvantaged, fully participates in society. It means having adequate opportunity for work, support for income and employment, and access to quality services that enable active participation in society, including through investment in individuals' capacities and opportunities for participation. In contrast, in post-independence South Africa, social cohesion has been identified with nation, peace-building, and diversity in a democratic dispensation, as a response to past racism and inequality (Palmary, 2015).

- Multidimensional, encompassing social, political, cultural, and economic dimensions, operating at different social levels. and potentially reflecting violation of social rights to participation and inclusion
- Dynamic, impacting populations in different ways and to differing degrees at different social levels over time
- Relational, focusing on exclusion as the rupture of relationships between a group of people and the wider society (Popay et al., 2011)

On the one hand, "exclusion" may be seen as a less stigmatizing label than "poor," and to make clearer links to concepts of social rights and justice. On the other hand, a focus on social exclusion can place too much emphasis on the social inadequacies of specific groups of people, rather than on the environments and processes that generate poverty and inequality (Popay et al., 2011).

The CSDH framework shown in Figure 4-1 positions social cohesion as an SDH that is structural, generating social differentials, and intermediary, as a condition. Popay et al. (2011) argue that applying an equity lens to the analysis of and response to SDH is more effective when social exclusion is understood in terms of processes that embed unequal power relationships and produce social inequalities, rather than as a static "state" in which particular groups are labeled as "excluded."

This perspective places inclusion and exclusion on a continuum that is a result of the distribution of social, economic, political, and cultural resources, capabilities, rights, and opportunities (Popay et al., 2011). This chapter points to various ways that such exclusionary processes manifest and affect health outcomes, such as in the transmission and response to the HIV epidemic in east and southern Africa (**EXHIBIT 4-8**), in slower and reduced access to services, in the impact of gender norms, or through precarious environments or displacement of people by large extractive industry projects.

Responding to processes and conditions that generate social exclusion is not a straightforward matter, and the responses are themselves affected by social determinants. In Colombia, for instance, people displaced by war were required to register with civil or military authorities as a means to access services, political rights, and social integration programs. Unfortunately, such registration also made people more visible, increasing their risk of discrimination and victimization and discouraging service uptake (Ojeda & Murad, 2005; Popay et al., 2011). Similar barriers to

EXHIBIT 4-8 Social Determinants in the HIV Epidemic

The HIV and AIDS epidemic illustrates the complex relationship between exclusionary processes and health disadvantage. To start with, the epidemic has been most prevalent in countries (particularly in sub-Saharan Africa) that already experience social, economic, cultural, and political disadvantages. In the initial stages of the epidemic in east and southern Africa, HIV transmission was associated with more mobile, urban populations and adult HIV prevalence was higher in wealthier, more educated, and urban groups. The transmission reflected social differentials, however, such as in power and income between older men and younger women. As a reflection of the gender inequalities described earlier in this chapter, the HIV prevalence in young women age 15–24 years was more than twice that of their male counterparts in southern Africa in 2003. The changes in both HIV transmission and survival reflected common social differentials: The distribution of prevention and treatment interventions followed typical social differentials in the region, with lower coverage levels among rural, poorer people with lower education levels, raising their susceptibility and vulnerability. By comparison, urban, wealthier people lived longer lives with HIV—sustaining their prevalence rates—due to their better nutritional status and uptake of services and greater mobility.

A number of studies revealed the negative impact on these SDH on the epidemic, with households affected by AIDS facing higher levels of falling household assets, income, social security, food consumption, and increased social exclusion. The stigma and discrimination associated with HIV, combined with other exclusionary processes, exacerbated social, economic, political, and cultural inequalities, interfering with prevention, diagnosis, and treatment. The initial social characterization of HIV/AIDS as a moral issue exacerbated a culture of silence and denial by people living with HIV because of fear of rejection and isolation. Household survey data from four sub-Saharan African countries with different epidemic patterns (Ghana, Kenya, Swaziland, and Zambia) showed that AIDS increased the share of the population living in income poverty, with the strongest effects occurring in those just above the poverty line, placing demands on and further eroding the community-level safety nets and social support networks on which disadvantaged communities depend on (EQUINET, 2012; Rispel, Molomo, & Dumela, 2008; Salinas & Haacker, 2006; Southern African Development Community [SADC], 2003).

uptake have been found in programs that profile conditions that have been associated with social discrimination (e.g., HIV).

State-led responses to social exclusion are generally organized through a range of approaches. For example, *universalist policies*, reflecting values of social solidarity, extend rights to publicly funded services to all citizens, such as publicly funded national health services that are free at point of care. Universalist policies may address SDH and processes that drive social exclusion, as, for example, is intended in the health-promoting schools described in **EXHIBIT 4-9**. As noted earlier, they may need to be complemented by specific measures to address barriers to uptake or coverage in different social groups.

A second approach is through *policies targeting specific social groups*. These policies are specifically designed for disadvantaged groups, and intended to remedy health disadvantages. In some cases, they take the form of *conditional targeted transfers*, involving some form of testing so as to target scarce services and health resources to those groups most in need, or to incentivize particular behaviors. They include social approaches, as exemplified in Exhibit 4-7. Targeted transfers include conditional transfers of cash or services, or a link between the two. As an incentive for service uptake in Brazil's Bolsa Familia, for example, recipients meeting the means test for a cash transfer must also ensure that their children attend health centers and school. Whether providing cash and/or services, these measures can bring resources to local services providers and promote economic inclusion. They are also documented to have limitations, however. For example, they are often insufficient to provide sustainable pathways out of low-income living, may impose bureaucratic barriers for some persons

EXHIBIT 4-9 Universal Measures to Address Social Exclusion: The Healthy Schools Program in South Africa

In South Africa, schools have been a focus of community-based prevention of negative social factors—including social power imbalances, poverty, violence, and substance abuse—that place learners at risk, including for health problems such as HIV and AIDS. South Africa has the paradox of relatively poor health outcomes despite the country's relatively high aggregate gross domestic product and level of health expenditure. Inequalities in health stem from a history of racial and gender discrimination, a migrant labor system, and high levels of income inequality. The country has sought to address social, racial, and gender disparities and realize social rights through redistributive policies, largely in the social sector.

The percent of adults in South Africa without schooling fell dramatically from 18% in 2001 to 7% in 2010, although with continuing inequality in access to education by region and racial group. Western Cape province, for example, despite being the second richest province in South Africa, has high rates of poverty, economic inequality, unemployment, crime, commercial sex work in teens, and substance abuse, contributing to social exclusion and poor health outcomes. As one response to these conditions, education was seen by the community as a key asset supporting social inclusion and autonomy, promoting the sexual autonomy of girls, and reducing their risk of contracting HIV. Despite this, a large proportion of high school students drop out before completing secondary school and school-age pupils have been found to engage in cigarette smoking, drug and alcohol abuse, interpersonal violence, and unsafe road-related and sexual behavior.

Education policy in the country has sought to strengthen universal access to education, and to support schools as sites for reaching adolescents and helping them acquire health-promoting skills and orientation. Based on the national health-promoting schools policy and approach, a program was initiated Western Cape in 1995 in which program leaders worked with community leaders, school staff members, school health nurses, parents, and the community to make schools a healthy and health-promoting environment for young people. The program integrates broad health promotion and education services, and promotes individual and social well-being for those at school and their families and community. It tackles content issues affecting social determinants, such as road safety, personal hygiene, substance abuse, HIV, and nutrition, and develops and supports alternative youth (and youth-led) activities such as teenage clubs, cultural activities, and camps. It incorporates local social and cultural resources, integrating local and indigenous knowledge, mentoring, and storytelling.

McNab (2013) found that this type of work depends more on a change in mindset rather than on the provision of major new resources, and on making a link between the "top down" influence of public policy and the "grass roots" approach of constructive community engagement. The social dimensions of the Western Cape program were seen to be a central element of its success: At a 2006 national conference, many presenters and participants highlighted the need to listen to and strengthen all voices in the program, and particularly the marginalized voices of local communities and indigenous wisdom, and of the learners themselves (Loewenson, 2013b; University of Western Cape, 2006).

with high health needs, and, as individual-based strategies, may have limited impact on promoting sociopolitical rights or building more inclusive political cultures (Lauthier, 2005).

A third strategy, *market approaches*, seeks to use private or state subsidies to support choices in the consumption of services by poor people to address economic or social barriers to such choices for the most marginalized households. For example, disadvantaged groups may obtain subsidies in insurance schemes to support their access to services or subsidies to address health determinants such as housing. This kind of market support is argued to face similar barriers as those detailed in relation to targeted transfers, and may potentially lead to poorer-quality services for subsidized groups and neglect deeper determinants of such disadvantage (Popay et al., 2011).

Whatever the overall approach, as the example in Exhibit 4-9 suggests, involvement of the people who are the intended beneficiaries of policies and actions that aim to reverse exclusionary processes is essential, as both as a resource and as a right. This implies building a deeper understanding of social power and agency as both determinants and key dimensions of successful policy and action. It suggests that actions that seek to tackle exclusionary processes should strengthen the power and capacity of those affected to engage in meaningful participation, while addressing resistance from professional workers who see it as a challenge to their technical power.

The demand for social participation, power, and agency in health has grown with increased social literacy and with democratic pressures for people's values and preferences to be incorporated into public decision making. The CSDH (2008) identified participatory approaches as a critical feature of health system action or intersectoral action for health to tackle SDH. Social participation has been integrated as a demand-side "intervention" to address barriers to access and acceptability of services and as a means to involve people as active participants in their own health care (Mittler, Martsolf, Telenko, & Scanlon, 2013). As a pragmatic measure, participation is seen to contribute to a range of areas necessary for the effective functioning of health systems:

- Community health literacy, public information, and the use of community knowledge on health
- Assessment, identification, and prioritization of health needs
- Health planning and decision making on spending priorities, resources, and budgets
- Policy deliberation and formulating strategic policy direction
- Co-design, coordination, and coproduction/implementation of health actions
- Oversight, monitoring, evaluation, review, and improvement of services, actions, and quality, including measures of social outcomes (Cornwall, 2008; Gilson et al., 2008; Loewenson & Gilson, 2012; Loewenson et al., 2014)

In a pragmatic and sometimes depoliticized approach, people as consumers or as volunteers may have minimal control over policies affecting structural determinants, but assume responsibility for implementation of compensatory actions. There may be limited change in current norms, processes, and mechanisms. While people may exercise oversight by monitoring, reviewing, and holding services accountable for their performance, they may not have the power to make the decisions that shape these services and may as volunteers take on unpaid burdens of care (Loewenson, 2016).

Participation has also been a product of political drivers, including through the actions of popular movements that have generated demand and sometimes conflict around health and around codetermination and accountability (Amar Amar & Echeverria Molina, 2008). As noted earlier, participation is viewed as the right to guide the duty bearers (states) in their implementation of other human rights. Citizens, including those engaging as health activists or in social movements, have pursued these rights through collective demands for change in areas of power, discrimination, beliefs, policies, and practices that are perceived as inequitable or as limiting their well-being, whether in relation to access to services or the SDH that affect the health of different social groups, or as a claim for shared decision making and oversight (Cornwall & Leach, 2010; Loewenson, 2016). The power, voice, and agency of affected groups can be found in invited spaces—created by external actors and in which people are invited to participate—or in *claimed/organic spaces*—created by people themselves, often as collective and popular self-organizing spaces around a common cause (Cornwall & Leach, 2010).

There are thus different conceptualizations of participation, taking different forms that express the different power relations that exist and the control that people have over events and resources. For example, a group may exert power "over" another group (such as when men control women's use of reproductive health services), may claim the power to be part of processes (such as when people living with HIV participate in price setting for treatment), may exert a shared power "with" each other (such as when communities organize as a group to engage service providers on delivery), or

may build a shared consciousness of themselves and their conditions in the form of a power "within" (such as when youth identify and call for changes in the way mental health services are organized to reflect their needs). In participatory processes where communities express their own collective voice and agency to an increasing degree, they build shared power as well as a consciousness and confidence to act. In contrast to fears that this paradigm diminishes the power of technical actors, it can be shown to create complementary forms of power that enable positive change, especially for community-level and frontline services, as exemplified in the case of Zambia described in **EXHIBIT 4-10**.

A growing number of studies using experimental or quasi-experimental designs in LMICs have demonstrated the potential of participatory interventions to generate health and health equity gains (Pronyk et al., 2006; Wallerstein, 2006). It is not easy, however, to be prescriptive about the specific mechanisms and measures to achieve these changes, as they are context

EXHIBIT 4-10 Social Participation and Power in Improving SDH in Lusaka, Zambia

Zambia is a lower-middle-income country; Lusaka is its capital city and home to 1.7 million people. The Lusaka District Health Office (LDHO) is the local health authority within Zambia's Ministry of Health. For more than a decade, LDHO has used participatory reflection and action (PRA) approaches to strengthen health services delivery at the primary care level and the role of neighborhood health committees (NHCs) as a more formal, sustained space for participatory interactions. As a matter of policy, NHCs involving elected community members are expected to identify and voice community health needs and to support information exchange between health services and communities.

In 2005, however, planning and budgeting for PHC was not participatory, and these committees were often poorly organized or not effective in their role. Growing public health problems in Lusaka motivated community members, health workers, and LDHO to address these shortcomings. Various participatory tools were used to identify needs, system barriers, and areas for change, and to build a shared identification of problems and actions to remedy them across health workers and community members. Information sharing between health workers and community members increased, community members became more confident in approaching health workers for information, and health workers provided the needed information to them for planning and resource allocation purposes. A range of actions were taken, including a cholera prevention strategy that led to significantly fewer cholera cases and deaths than in previous years, despite the heavy rains. By the end of this first phase of work, the community members had developed greater confidence and enthusiasm in seeing the process move forward. Likewise, health workers noted the benefits of improved communication with the community, though some feared losing power.

In 2008–2009, the same PRA approaches were used to scale up the health system by establishing new health centers in the city, while consolidating and building capacities to institute the approaches in existing ones, and building partnerships with a range of other sectors in areas such as clean-up campaigns, solid waste management, healthy food production, and services performance and uptake. These efforts were complemented by a range of approaches to organize and use community evidence. Photovoice (community photography), for example, presented evidence on community concerns with blocked sewers, health facility corruption, poor water supplies, and solid waste management during clinic and district health meetings held to trigger actions to resolve these problems. A wider community-level health literacy process with Lusaka residents drew evidence from their lived experience, facilitating community-level diagnosis, providing relevant health information, and stimulating action and engagement with health systems, in partnership with service providers, civic leaders, and the local authority. These approaches positioned the communities as change agents. Every three months, those working on the action plans met to review their work, reflect on their experience, and evaluate their progress.

Pre- and post-intervention surveys and reports from health workers and communities about the initial 2006–2008 PRA work found improved interactions between health workers and community members and partnerships with other actors, and increased confidence of community members in providing inputs to planning processes in support of action on health. There is also some evidence of positive health outcomes associated with this work. For example, the clinic catchment areas where these activities took place had no cases of cholera in 2012–2015, at a time when other areas still reported cases. While it is not possible to solely attribute the positive outcomes to the PRA program, the removal of waste sites that were once a site of disease and the measures to increase community health literacy and action were perceived to have made an important contribution. The health literacy work and the engagement with neighborhood health committees is now being expanded beyond Lusaka in a national scale-up in light of the positive outcomes from the work done in Lusaka District (LDHO & TARSC, 2016; Lusaka District Health Management Team &TARSC, 2015; Mbwili-Muleya, Lungu, Kabuba, Zulu Lishandu, & Loewenson, 2008; Ministry of Health Zambia, LDHMT, & TARSC, 2012).

dependent. Many of the approaches are triggered by or involve action outside the health system, in other sectors and organizations, and within the community itself. Various features of health systems have, however, been found to support the spaces and shifts in social power that enable effective participation. These approaches include the following:

- Setting health interventions in sites that are familiar to communities, such as markets or schools
- Integrating community mapping, monitoring, and preferences in health planning
- Producing accessible information (such as through newsletters, meetings, and social media) that shares local experience and responds to perceived needs
- Using socially appropriate and participatory methodologies that build on and validate local experience and knowledge
- Involving and supporting community-elected and -located community health workers to strengthen communication and linkages between health systems and communities
- Providing opportunities for dialogue on community perceptions of services, through community audits, health watches, community councils, participatory research, and legal action
- Devolving meaningful budgets to lower levels of the health system to facilitate and support social roles
- Enabling communities to shape the "rules of the conversation" by giving them the ability, resources, and opportunity to define the terms and processes in which they participate and the issues they want to address, and to have input into national laws and policies
- Investing time and resources in, and providing management support for, health worker competencies and incentives for participatory processes (Benequista, Gaventa, & Barrett, 2010; Cornwall & Leach, 2010; Gilson, 2007; Loewenson, 2016; Loewenson et al., 2014; Mbwili Muleya et al., 2008).

Implementing such measures depends on wider contexts, including the political freedom, spaces, and capacities that groups have to voice their views and to exercise influence; the constitutional, legal, and policy frameworks, social organizations, and systems that enable participation and support an active and democratic culture; the sociocultural conditions and relations within communities and families; and a comprehensive understanding of health and well-being that integrates and is accessible to society (Arenas-Monreal, Piña-Pozas, & Gómez-Dantés, 2015; Loewenson, 2016). These factors are not just shaped at local and national levels. That is, the local SDH and the social, institutional, and technical processes that affect them are increasingly influenced by global processes, and by decisions made by global and international actors. This topic is discussed in more depth in the next section.

Global SDH, Local Impact: Experiences of Extractive Industries in East and Southern Africa

As noted earlier, globalization is transforming many of the social conditions that have the greatest impact on health, while also affecting the public policies and programs that target these determinants. Many of the elements identified within the socioeconomic and political context in Figure 4-2 are now influenced by global policies, institutions, and processes.

A review of international evidence on globalization and SDH identified that while globalization has both positive and negative impacts on health, its benefits are unevenly distributed (Labonte & Shrecker, 2008). In this review, the benefits were reported to have been primarily obtained by countries and communities that already had financial, land, physical, institutional, and human capital assets. While globalization has certainly brought opportunities, such as the flow of information and new global funding to address health issues, the rules of current forms of globalization were found to favor already rich countries and people, which have greater resources and power to influence their design (Labonte & Shrecker, 2008; World Commission on the Social Dimensions of Globalisation 2004). In sub-Saharan Africa, globalization policies were associated with debt crises, capital flight, and structural adjustment programs that were reported to have contributed in part to increased inequality in health and reduced gains in life expectancy (Labonte & Shrecker, 2008). Examples of the mix of positive and negative outcomes are shown in **EXHIBIT 4-11**.

With the growing impact of global determinants on health, an analysis of globalization and SDH merits deeper attention than a subsection of a chapter. The distribution of positive and negative impacts of global determinants of health is further discussed in the *International Trade and Health*, and *Global Health Governance and Diplomacy* chapters in this text, and

EXHIBIT 4-11 Globalization, Women's Occupational Roles, and Nutrition in Sub-Saharan Africa

A 2010 review of 62 peer-reviewed publications on pathways between globalization, women's occupational roles, and nutrition found a mix of positive and negative outcomes, although with greater documentation of negative outcomes for women's health and nutrition.

At the global and national level, 5 papers reported largely positive outcomes for SDH, with globalization-related innovations in technology and information, global normative commitments, and improved incomes, markets, and opportunities for improved diets from investments where women are involved in export-oriented farm production. However, 24 papers reported largely negative outcomes, with trade liberalization, terms of trade, market access, and value-added food chains largely benefiting existing wealth and foreign corporations; gender inequity in access to investment, technology, and extension services due to "gender-neutral" trade policies; shifts to imported foods and processed foods displacing local food crops with livelihood losses for women; and diminishing healthcare resources raising the costs of care.

At the community and household levels, 7 papers noted largely positive impacts in terms of improved returns from new technologies in crop yields, increased nonfarm employment, and information flows that challenged gender-related discrimination improving women's conditions, with positive returns for household nutrition. Here, too, however, the larger number of papers (34) pointed to negative impacts at the community and household levels from determinants related to global trade, arising due to weak consideration of existing gender inequities in access to and control over production inputs in policy and program design; insecurity of and poor wages in new forms of employment; decreased time for household needs and neglect by women of their own well-being to meet time and resource demands; and decreased availability of local foods and increased consumption of higher-cost and poorer-quality imported and processed foods (Loewenson, Bambas Nolen, & Wamala, 2010).

so is not covered in detail here. This section explores global drivers of local SDH and the responses to them through the example of the extraction of mineral resources from Africa, largely through global corporations and interacting with global capital markets. It also highlights how global and regional norms can be positively applied to address negative health outcomes.

In 2009, Africa's oil, gas, and minerals exports were worth roughly five times the value of international aid to the continent ($246 billion versus $49 billion), with African oil and mineral resources sought after by high- and middle-income countries, including the emergent economies of China, Brazil, and India (Loewenson, Hinricher, & Papamichail, 2016). A surge in demand led to exploration and development of many new mining sites and new agreements exchanging investment in infrastructure for mining rights to oil, coal, and various strategic minerals (Besada & Martin, 2013; Shelton & Kabemba, 2012). As a consequence of this activity, African countries are increasingly engaging in global markets. At the same time, the rewards from these ventures are reported to be skewed toward those countries and individuals who have existing economic power (Birdsall, 2005). African countries that are rich in these mineral resources have experienced high levels of inequality and poverty—often referred to as "the resource curse" (Global Witness, 2012). A literature review of the health and SDH related to extractive industries in east and southern Africa found that they are significant economic actors in the region, but with limited forward or backward linkages into the national economy and limited job creation outside the sector, unless specifically stimulated (Loewenson et al., 2016).

This finding draws attention to how extractive industry (EI) activities, as a determinant of health, meet their responsibilities to protect against harm to health and make fiscal contributions to health care for the populations who work in or are affected by them. Corporations have duties to assess the potential risks of their activities to workers and surrounding communities, and to prevent and manage these risks. In recent years, more attention has been given to environmental risks associated with EIs, to EI company's duties to populations displaced by their activities, and to the duties that they have to inform and enable co-determination and participation of those affected in making the decisions that affect their health (International Labour Organisation, 2014; Murombo, 2013).

The health benefits of EIs have largely come from employment, income, and some service provision, generally for those persons who are directly employed by the mining companies and their families, and from EI fiscal contributions to public services. Nevertheless, tax exemptions often reduce their contributions to social funding. EIs also bring risks to health: They have been found to lead to accidents, hazardous

working conditions, environmental hazards, degradation of ecosystems, poor environmental health infrastructure, and displacement of local people—all of which increase the risk of disease. The literature reports the spread of communicable diseases (such as tuberculosis) and cholera epidemics from poor environmental health infrastructure, sexually transmitted diseases, and HIV in communities surrounding the mines (Aaboe & Kring, 2013; Catholic Relief Services [CRS], 2011; Loewenson et al., 2016).

Poor communities living around the mines are reported to be particularly vulnerable to pollutants, given their poor living conditions, with less recognition or monitoring of their risks. They are also least able to obtain reliable information on these risks, or to register their concerns with decision makers (CRS, 2011; von der Goltz & Barnwal, 2014). Mining is associated with (sometimes forced) displacement of communities, with reports indicating several thousand families having been resettled to facilitate mining in some countries (Global Environment Facility [GEF], Open Society Initiative for Southern Africa [OSISA], & United Nations Development Programme [UNDP], 2013; Human Rights Watch [HRW], 2013). As a health determinant, poor planning of such displacement is reported to have led to loss of livelihoods; loss of access to water, flora, arable land, and pastures for livestock for these communities; and substandard living conditions. Affected communities were poorly consulted on plans discussed with government, making it difficult for them to hold companies accountable when they did not deliver on commitments, and generating social frustration (HRW, 2013). For those living near mines or displaced by mining, exclusion from decision making on measures to address the health and social impacts, noted in many reports, is reported to have led these groups to "bear a disproportionate share of the costs of mineral development without adequate compensation, and to receive an inappropriately small share of the economic and social benefits" (International Institute for Environment and Development, 2002, p. 208).

As a key structural determinant, the policies and actions of the state play a vital role in protecting the health of populations caught in the midst of these global processes. For the health sector, this calls in part for public health leadership to leverage cross-sectoral health-promoting actions to manage health risks. **EXHIBIT 4-12** overleaf tells the story of one such response—that is, the experience of Tete in Mozambique. Other examples exist of state action in the east and southern Africa region, including using environment and health impact assessments to assess health risks, implementing audits to review the performance of EIs as in Zambia, and setting contract/lease renegotiations or renewals to review, require, or impose new obligations in Democratic Republic of the Congo, Zimbabwe, South Africa, and Mozambique (De Backer, 2012; GEF et al., 2013; Kabemba, 2014). While EI contributions for health and social welfare are generally identified as areas of voluntary corporate social responsibility (CSR), Democratic Republic of the Congo introduced a micro-levy on EIs in September 2014 to fight chronic malnutrition; in the same year, Zimbabwe lifted the exemption on the sector that had allowed EIs to avoid contributing to the AIDS Levy Fund (Loewenson et al., 2016).

As multinational EIs are themselves global actors, managing health in conjunction with EIs also calls for global governance arrangements to recognize and integrate social obligations for addressing SDH. At the global level, there are now numerous international standards, codes, or guidance documents related to the practices of EIs and multinational enterprises. These exist at the UN multilateral level, from Organisation for Economic Co-operation and Development (OECD) countries, at the African Union level, from financial institutions, and in CSR standards developed by international business and by civil society. Some regions, such as the Economic Community of West African States (ECOWAS) in West Africa, have moved toward a "strength in numbers" approach, with efforts to harmonize laws relating to EIs, including laws targeting health and social protection at the subregional level (Loewenson et al., 2016). The inclusion of these global norms as legal provisions in east and southern Africa and their strengthened implementation and oversight with accountability at the global, regional, and national levels, including in the source countries of EIs, have been identified in the literature as important measures to address the local health impacts of such global-level determinants (Loewenson et al., 2016).

The focus on EIs in this section presents one example of global-level SDH. Many others could be cited, including in the various dimensions of trade and health and climate change discussed in other chapters in this text. The experience in Tete described in Exhibit 4-12 and that of other countries in east and southern Africa in managing these challenging contexts suggests that while local communities and services may be organizing cross-sectoral responses to such global drivers, more attention is needed to determine how best to ensure that global standards are enforced, including by transnational, private actors.

EXHIBIT 4-12 Managing SDH in the Context of a Growing Extractive Sector: Tete, Mozambique

Tete province's geographical positioning, significant natural assets, and influx of investment, people, and capacities offer opportunities for addressing health needs in this region. Investments in hydroelectric power and coal mining have dominated recent investments in Tete, such that the province had the second highest provincial GDP growth in Mozambique between 2002 and 2008, largely driven by extractive industries. While these investments have brought economic benefit, they have also placed demands on infrastructure and services, led to displacement of people, and increased risks of injury, ill health, and social risks from displacement, harmful alcohol use, and road traffic accidents. Within the context of the communicable, reproductive, and other health burdens in the province, there is evidence of high social deficits in the very districts that host these large projects. The population in Cahora Bassa, a district with significant new power projects, has poorer health status outcomes than the populations in districts with less investment; Moatize, where the mines are concentrated, has fewer health service resources and poorer coverage outcomes; likewise, Tete City, a richer area and the focus of economic activity, also has poor health status outcomes. Tete City, Cahora Bassa, and Moatize had calorie-adjusted poverty rates in 2007 that were higher than those in most other districts in the province, including districts that were worse off than these three districts in 1997.

These findings raise the question of how such economic investment can be better linked to improved population well-being. One route for managing these SDH is through upstream entry points, linking EI activities to value-added local production, including in small and household enterprises, and providing links to their markets and infrastructures. Further upstream entry points include improved corporate fiscal and other resource contributions for public spending on education, health, and other social services, and the integration of health and social impacts in environmental impact assessments prior to granting a mining license.

Within this context, an assessment of the SDH, opportunities, and deficits carried out in 2014–2015 with the Tete provincial department of health (DPS Tete) identified key areas of action for the five-year provincial health strategy, including the following:

1. Closing the gap in improved household living conditions implemented through an intersectoral mechanism; ensuring all schools and health centers are connected to the power network; promoting small enterprise production of clean technologies for household cooking and energy; earmarking budgets and levies from local businesses for rapid improvements in rapidly growing settlements, such as Tete City and Moatize; and monitoring risks, interventions, and health impacts.
2. Promoting and protecting worker and community health in production activities, with measures outlined to promote occupational and community health and protect against production-related risks, including through environment, social, and health impact assessments; involving health personnel in oversight of corporate duties related to resettlement; and integrating company roles and resources in health services and activities in their districts.
3. Coordinated multisectoral strategies to improve food security and nutrition.
4. Expanding and improving equity in access to PHC, and positioning the health sector as a key redistributive sector in inclusive development, including through entry points in schools and workplaces, through private-sector contributions to healthcare services, and by enhancing community health literacy.

The province is now building support within other sectors for wider cross-sectoral implementation of these actions under the leadership of the governor of the province and with representatives of sectors at the national, provincial, and district levels (Loewenson & Simpson, 2015; Ministério da Planificação e Desenvolvimento, 2013; Ministério de Saúde, Mozambique, 2014; Republic of Mozambique et al., 2016; Salvucci, 2014).

Evaluating Action on the Social Determinants of Health and Health Equity

This chapter has presented evidence on the diversity of SDH and on the analysis and actions being applied to tackle them, including measures to address health equity. WHO's CSDH was a culmination of longstanding efforts by policy makers, state officials, academics, practitioners, and civil society to improve knowledge and evidence on the nature and extent of social determinants of health equity and to identify and implement policy or program actions to tackle them (Simpson, Kelly, & Morgan, 2013). Evaluation of such interventions has been important to gather evidence and build learning from their implementation about options to address the social determinants of health inequities; one such evaluation is described in **EXHIBIT 4-13**.

One of the recommendations of the CSDH to "close the gap in a generation" was to "measure the

EXHIBIT 4-13 Evaluating Interventions to Reduce Health Inequities

A six-year program was implemented in the Netherlands in the late 1990s to systematize learning from policies and interventions to reduce health inequities. Twelve studies were commissioned to evaluate a range of interventions to tackle SDH known to contribute to health inequities *and* to reduce exposure of lower-socioeconomic groups to these factors (e.g., poorer working conditions). Methods used ranged from observational to quasi-experimental to experimental studies. Evaluation of seven interventions gave positive results, with the researchers finding an improvement in at least one health outcome and/or an intermediate outcome. For example, a rotation of tasks among dustmen (i.e., garbage collectors) reduced physical workload and sickness absenteeism. Overall, the program sought to contribute to an evidence-informed approach for developing a national response to health inequities. It recommended that evaluation studies using a variety of approaches be embedded in all future interventions on health inequities (Stronks & Mackenbach, 2005; Simpson et al., 2013).

DEFINITION

A *realistic evaluation* approach combines assessment of design, process, and outcome and attempts to provide answers not only about which interventions work to address SDH, but also how they work and in which context(s) (Kelly et al., 2007).

problem, evaluate action, expand the knowledge base, develop a workforce that is trained in the social determinants of health, and raise public awareness about the social determinants of health" (CSDH, 2008, p. 20). This includes ensuring routine local, national, and international monitoring of SDH and health equity; investing in and building capacities to generate and share new evidence on the relationship between SDH and population health and health equity, and on the effectiveness of interventions to tackle these SDH; and raising public awareness on the findings (CSDH, 2008).

To date, a significant body of evidence has been developed on the "problem," on the link between specific SDH and health outcomes (particularly for intermediary SDH), and on the associations between SDH and health equity. By comparison, progress has been slower in evaluating the effectiveness and equity impact of interventions, and in generating attributions of impact to health or health equity and structural SDH. In part, this is due to the complexity of the methods used and the evidence needed to assess the commonly multicausal and context-dependent nature of the interventions for the "problem." While there is increasing recognition of the value of implementation and health systems research using new methodological approaches, there has been a continued predominance of a biomedical paradigm in health research and the use of traditional evidence-grading systems to value evidence. This has led to intervention studies on SDH, and the qualitative methods used to understand contexts for and impacts of complex interventions on SDH, often being classified as "unscientific" and "value-laden," despite their reliance on accepted social science methods (Baum, 2010; Bonnefoy et al., 2011). That this situation is changing is evidenced, for example, by the growing efforts to measure action on SDH among and within countries, by the documentation of country-level action on SDH, and by the Cochrane Equity Methods Group guidance on explicitly addressing equity in systematic reviews (Campbell & Cochrane Equity Methods Group, 2017; O'Neill, Tabish, Welch, Petticrew, Pottie, Clarke et al., 2014).

The CSDH Measurement and Evidence Knowledge Network emphasizes that no single approach to the generation of evidence should be favored over others and that evidence should not be appraised on the basis of adherence to a single evidence hierarchy or method (Kelly, Morgan, Bonnefoy, Butt, & Bergman, 2007). Health impact and equity impact tools, such as those outlined earlier, and more comprehensive approaches such as "realistic evaluation," support evidence on SDH and health equity because they move beyond simply estimating the likely effect of policy, to constructing logic models that show the implementation chain from policy to implementation in practice (Kelly et al., 2007). A range of methods and evidence enable practitioners to understand the complexity of mechanisms and the multifactorial nature of determinants that apply in practice and can make explicit the theories upon which programs are based. Realistic evaluation, for example, helps to capture the linkages between the context (the necessary conditions for an intervention to trigger mechanisms), the mechanisms (the aspects of a particular intervention that lead to a particular outcome in a given context), and the outcomes (the practical effects produced by causal mechanisms being triggered in a given context) (Kelly et al., 2007).

As argued earlier in this chapter, evidence and analysis contribute to the building of the relationships and complexity of interventions often needed to address SDH, including for intersectoral action and HiAP. Having an explicit and shared conceptual framework and theory of change at the outset helps to clarify the pathways for change, to identify shared outcome measures for assessing performance and impact, to prioritize action, and to test the thinking, thereby informing subsequent IAH work (Loewenson, 2013a). Analytic frameworks that explicitly include the assessment of equity in the design, implementation, and assessment of outcomes, while important, are not always present in evaluations of intersectoral action on SDH (Shankardass, Solar, Murphy, Greaves, & O'Campo, 2012).

The South Australian program on HiAP described in Exhibit 4-2 has, for example, taken a two-phase approach to evaluating its work: The first is an evaluation of perceptions of, interests in, and processes for HiAP implemented through interviews with senior South Australian public servants from the beginning of the initiative and continued in tandem with the health lens analysis. The second is a more comprehensive approach implemented in three overlapping stages over a five-year period (2012–2016) and using mixed methods, including test of a logic model of and theories of change for the work, shown in **FIGURE 4-7** (Baum et al., 2014).

Semi-structured interviews were implemented with key political figures, officials, and other actors who have knowledge of the HiAP process to generate knowledge to support its development and implementation. In the second stage of the evaluation, the theories developed in the first stage were tested, and the program logic and practice of implementation of the HiAP examined in eight health lens analysis projects, with detailed analyses in two of these health lens analyses and online surveys of policy actors administered regularly over the five-year period. A final stage synthesized the evidence to produce transferable knowledge and disseminate findings in annual research forums for peer review and discussion (Baum et al., 2014).

The features of the South Australia evaluation, which included multiple methods, stages, and areas of

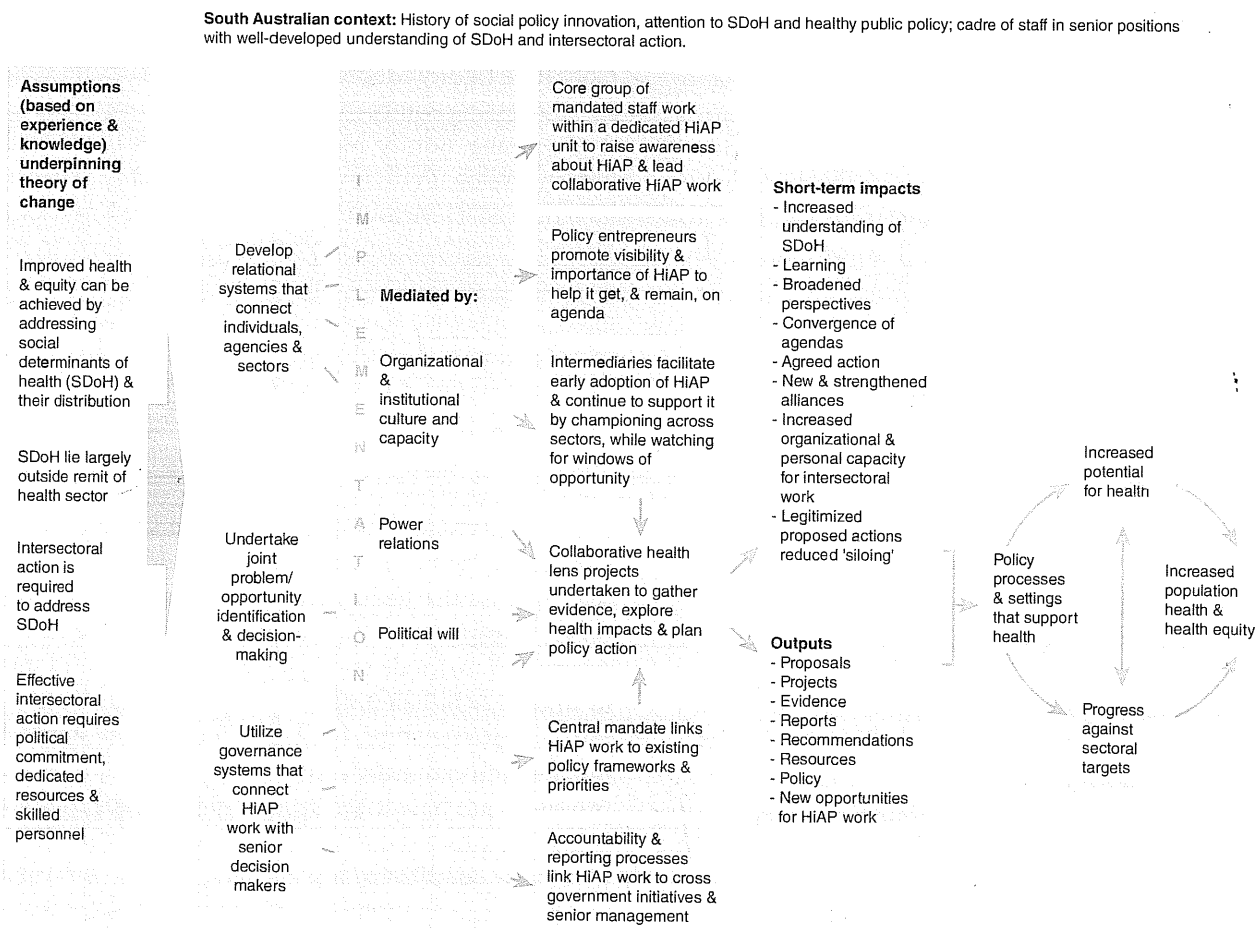


FIGURE 4-7 A preliminary program logic approach for evaluating HiAP in South Australia.

Reproduced from Baum, F., Lawless, A., et al., 'Evaluation of Health in All Policies: concept, theory and application', Health Promotion International, 2014, 29 (suppl 1): i130–i142, by permission of Oxford University Press.

focus in the evaluation and multiple forms of evidence generated to support strategic reflection, are reflected in other processes for evaluating SDH. WHO has developed Innov8, an eight-step analytic process to be undertaken by a multidisciplinary review team to identify improvements in program performance and actions on SDH, health equity, and gender equality, as well as progressive realization of universal health coverage and the right to health. Innov8 applies realistic evaluations and integrates areas of human rights, health systems strengthening, and gender into its assessments. It builds a theory of change into the review analysis, including how and why interventions and activities are expected to produce results in these areas (WHO, 2016). A series of Innov8 publications and resources, including country case studies, are available that demonstrate application of this approach in areas such adolescent sexual and reproductive health, maternal and child health, and cervical cancer screening (WHO, 2016).

Routine collection, review, and reporting of data on SDH are as important as specific evaluations for effecting changes in and ensuring accountability of policy commitments made. Further, while increasingly sophisticated methods are available for measuring and analyzing social gradients in health and the impact of interventions, actually *using* such information in policy and stakeholder forums is critical to realize improvements in SDH and health equity. WHO (2013b) provides a resource for ministries of health to support the monitoring of social determinants of health equity, through a series of eight online presentations and a link to the Health Equity Assessment Toolkit (HEAT; a software application that facilitates assessment within and across countries using available data).

Equity Watch reports provide a further example of use of evaluations—in this case, analyzing routine, household, and available community data on SDH and health equity in Africa (**EXHIBIT 4-14**). Almost all ESA countries have made policy commitments to promote equity in health. In 2007, the Regional Network on Equity in Health in East and Southern Africa (EQUINET)—a network of professionals, civil society, state, parliament, and academic actors promoting health equity—analyzed and reported on health equity in the region, building a cooperation with the east, central, and southern Africa (ECSA) health community to gather and report on evidence on health equity (Rasanathan, 2011). In 2012, an "Equity Watch framework" of 25 priority indicators of health equity was used to organize evidence from 16 countries in east and southern Africa, complemented by Equity Watch work in countries (EQUINET, 2012). National teams in six countries in the region involving state and nonstate actors and working with EQUINET organized, analyzed, and presented quantitative and qualitative evidence to assess progress in addressing health inequities, to evaluate social determinants and health care, and to inform social dialogue on proposals for strengthening health equity. The national reports have been used to monitor implementation of equity in the implementation of the national health strategic plans (in Zambia and Zimbabwe) and to inform policy dialogue (in Kenya and Zimbabwe) and research (in Mozambique and Zimbabwe) (EQUINET, 2012; Rasanathan, 2011). The Equity Watch process is an evidence-driven approach to strengthening rights to participation and accountability on equity in relation to SDH and universal health systems.

A range of indicators are used in such processes for relative and absolute measures of health inequities (e.g., rate ratios and rate differences across two groups) and to gain insight into the patterns of health inequities in populations, such as through the Gini coefficient or the concentration index (Kelly & Doohan, 2014). The indicators used may be related to the following issues:

- Political and legal factors, such as the presence of constitutional rights to health or, conversely, the presence of constitutional or legislative barriers to health, such as early marriage
- Economic factors, such as the gross domestic product, level of tax revenues, and household poverty or wealth, often expressed in quintiles of the population

EXHIBIT 4-14 The Equity Watch in East and Southern Africa

An Equity Watch is a means of monitoring progress on health equity by gathering, organizing, analyzing, reporting, and reviewing evidence identified from policy commitments made and from research evidence deemed relevant for improving equity in health. In addition to areas of importance for specific countries, 25 progress markers are included in all Equity Watch reports:

- Five markers of advancing equity in health
- Seven markers of access to national resources and SDH
- Eight markers of resourcing redistributive health systems
- Five markers of a more just return from a global economy

Information and country and regional equity watch reports are available at www.equinetafrica.org (EQUINET, 2012).

EXHIBIT 4-15 The EU's SOPHIE Project

The EU's "Evaluating the Impact of Structural Policies on Health Inequalities and their Social Determinants, and Fostering Change" (SOPHIE) project sought to generate new evidence on the impact of structural policies (macroeconomy, welfare state, employment relations, unemployment, built environment, and housing policies) on health inequalities, and to develop innovative methodologies for the evaluation of these policies in Europe. The Gender group of SOPHIE developed guidance for assessing how gender intersects with other social, cultural, and economic determinants, and evidence on how gender-oriented and immigration-related policies affect health inequalities. This work enables strengthened and more comprehensive evaluations of the health equity impact of policy and interventions. The main findings of the SOPHIE project include the following: (1) Evaluating structural policies is a new methodological challenge; (2) mixed methods are essential to the evaluation of structural policies; and (3) realistic approaches help to address new and vital questions, while noting the need for a clear and efficient working protocol to be developed. Further information is available on the SOPHIE project at www.sophie-project.eu/project.htm (Palència, Malmusi, & Borrell, 2014).

- Services and entitlements, such as education completion, health service coverage, or social protection
- Living standards and material conditions, such as access to clean water, air pollution, traffic density, housing, and sanitation
- Social features, such as culture, residence, class, occupation, ethnic groups, age, gender, disability, and religion (Kelly & Doohan, 2014; Solar & Irwin, 2010)

Some key factors, such as power relations, social control/autonomy, and social support are less easily measured and often less effectively included in assessments. Factors such as gender may be intertwined with power relations and other SDH in generating health inequities. As noted at the beginning of this chapter, sociopolitical processes are themselves structural determinants that can persistently impact on health outcomes, such as the processes of colonization that negatively impact indigenous peoples' health (Axelsson et al., 2016). For this reason, research and evaluation of policies affecting determinants of health equity need to take all these dimensions and their intersections into consideration, as in the European Union's SOPHIE project (described in **EXHIBIT 4-15**).

It is important that the processes for evaluation, monitoring, and analysis strengthen the social power of those affected by these SDH, and do not alienate them. In part, this means explicitly including SDH prioritized by these groups, including those determinants that are difficult to measure, and directly involving affected communities as researchers and agents of change in analysis and learning from action, such as in participatory action research and participatory evaluation processes (Loewenson et al., 2014; SHaPeS Thematic Working Group of Health Systems Global et al., 2016).

Conclusion

This chapter has explored a range of country experiences and published reviews and papers to develop a conceptual understanding of the different levels and types of SDH; their relationship to health equity, human rights, and gender equality; and their implications for health systems and for intersectoral and whole-of-government actions directed toward health and health-in-all-policies systems. While clearly a "work in progress," the growing body of evidence on all levels of SDH and their association with health outcomes is opening a deeper understanding of the "causes of the causes" in health outcomes. It is also building knowledge on how SDH at a structural level generate social stratification and social differentials in a range of intermediary SDH with an impact on health. Where these social differences in health are avoidable and remediable, they call for action on the SDH underlying them as a matter of social justice and human rights. The SDH perspective draws attention to measures to frame, understand, and integrate into interventions factors such as social exclusion, social agency, and power.

Through these approaches, those working in health-related fields can promote health and well-being and address differences in exposure and vulnerability. They can take a leadership or facilitating role in intersectoral action, and mediate or mitigate the financial, social, and physical consequences of illness. This is not just a matter for local and national levels to address. As this chapter has pointed out, globalization is influencing structural and intermediary SDH at the national and local levels, driving the need for normative and other actions on such SDH from the local level to the global level, to ensure fair benefits and prevent harms.

This chapter concluded with observations on how the positive or negative impact of these actions may be monitored and evaluated, including in terms of their distributional impacts. Evidence on and analysis of the relationship between SDH and health (equity) outcomes, while raising measurement and method challenges, is important to inform action, and to support evaluation of interventions and processes that seek to "close the gap."

At the same time, these policies and actions need to be understood in terms of how they affect the social power and status of those communities affected by them, and how they impact procedural justice. Participatory processes, wherein communities document and express their collective experience, voice, and agency, can build forms of shared power and social support that enable and sustain action on SDH, and are a social asset and a right in processes that build knowledge and action on SDH. Addressing unfair, avoidable, or remediable differences in SDH and improving health equity outcomes among population groups is not simply a technical issue: It is an ethical issue, a matter of social justice, and an outcome of social power and action.

Acknowledgments

The authors acknowledge complementary work by Kelly and Doohan (2014) in a chapter on SDH in an earlier edition of this text, together with the contributions to this field of the work made by the Commission on the Social Determinants of Health, by WHO, by regional organizations such as EQUINET, and by the many country actors cited in the chapter. We are grateful to Victoria Saint for her peer review of an early version of the chapter.

Discussion Questions

1. What is the difference between health inequality and health inequity?
2. What are the key features and dimensions of conceptual frameworks that explore the relationship between social determinants of health and health equity?
3. What are the different ways that action on SDH can reduce health inequities? Provide an example of each.
4. What role does gender play in health equity? How does a human rights approach affect the way this issue is addressed? Provide examples to demonstrate your response to both questions.
5. What can health systems do to support the measures for successful implementation of intersectoral action for health? Which features of health systems have been found to facilitate these roles? Provide examples to demonstrate your response to both questions.
6. "Social power affects the ability people have to influence and make choices over health inputs and to use these inputs to improve their well-being." Explain, with concrete examples, the pathways through which social power may positively or negatively affect health equity.
7. What are the key features of approaches used to monitor and evaluate interventions on the social determinants of health equity?

References

Aaboe, E., & Kring, T. (2013). *Natural resource management and extractive industries in Mozambique: A UN Mozambique Study.* Maputo, Mozambique: UN Country Team.

Amar Amar, J. J., & Echeverria Molina, J. (2008). Participación comunitaria para el control ciudadano de los servicios públicos domiciliarios, *Revista de Derecho, 29,* 129–152. Retrieved from http://www.scielo.org.co/pdf/dere/n29/n29a06.pdf

Amerson, R. (2013). Contributing to family health using a *promotora* programme in Guatemala. *Journal of Community Engagement and Scholarship, 6*(1), 3.

Arenas-Monreal, L., Piña-Pozas, M., & Gómez-Dantés, H. (2015). Aportes y desafíos del enfoque de género en el estudio de las enfermedades transmitidas por vector. *Salud Pública de México, 57*(1). 66–75. Retrieved from http://www.scielo.org.mx/scielo.php?pid=S0036-36342015000100010&script=sci_arttext

Australian Institute of Health and Welfare (AIHW). (2012). *Australia's health 2012.* Australia's Health Series No. 13. Cat. No. AUS 156. Canberra, Australia: Author.

Axelsson, P., Kukutai, T., & Kippen, R. (2016). The field of Indigenous heath and the role of colonisation and history. *Journal of Population Research, 33,* 1–7.

Baum, F. (2010). Overcoming barriers to improved research on the social determinants of health. *MEDICC Review, 12*(3), 36–38.

Baum, F., Lawless, A., Delany, T., Macdougall, C., Williams, C., Broderick, D., . . . Marmot, M. (2014). Evaluation of Health in All Policies: Concept, theory and application. *Health Promotion International, 29*(suppl 1), i130–i142.

Benequista, N., Gaventa, J., & Barrett, G. (2010). *A policy-maker's guide to the research of the Development Research Centre on Citizenship, Participation and Accountability.* London, UK: Department for International Development.

Besada, H., & Martin, P. (2013). *Mining codes in Africa: Emergence of a "fourth" generation?* Ottawa, Canada: North-South Institute.

Birdsall, N. (2005). *The world is not flat: Inequality and injustice in our global economy.* WIDER Annual Lecture 9. Helsinki, Finland: UNU World Institute for Development Economics Research.

Bonnefoy, J., Morgan, A., Doohan, E., Popay, J., Mackenbach, J., & Kelly, M. P. (2011). Measuring the social determinants of health: Theoretical and empirical challenges. In J. H. Lee & R. Sadana (Eds.), *Improving equity in health by addressing social determinants* (pp. 263–293). Geneva, Switzerland: World Health Organization.

Braveman, P., & Gruskin, S. (2003). Poverty, equity, human rights and health. *Bulletin of the World Health Organization, 81*(7), 539–545.

Bucket, K., Williams, C., & Wildgoose, D. (2011). *Health in All Policies: South Australia's country case study on action on the social determinants of health.* Draft Background Paper No. WCSDH/BCKGRT/5/2011. Retrieved from http://www.who.int/sdhconference/resources/draft_background_paper5_australia.pdf?ua=1

Calma, T. (2007). *Social determinants and the health of Indigenous peoples in Australia: A human rights based approach.* Workshop paper presented by Mr Darren Dick on behalf of Mr Tom Calma, Aboriginal and Torres Strait Islander Social Justice Commissioner, International Symposium on the Social Determinants of Indigenous Health, Adelaide, 29–30 April 2007. Retrieved from https://www.humanrights.gov.au/news/speeches/social-determinants-and-health-indigenous-peoples-australia-human-rights-based

Campbell and Cochrane Equity Methods Group. (2017). Cochrane Methods: Equity website. Retrieved from http://methods.cochrane.org/equity/

Catholic Relief Services (CRS). (2011). *Extractives and equity: An introductory overview and case studies from Peru, Angola and Nigeria.* Baltimore, MD: Author.

Commission on the Social Determinants of Health (CSDH). (2008). *Closing the gap in generation: Final report of the Commission on Social Determinants of Health.* Geneva, Switzerland: World Health Organization. Retrieved from http://www.who.int/social_determinants/en/

Cornwall, A. (2008). Unpacking participation: Models, meanings and practices. *Community Development Journal, 43*(3), 269–283.

Cornwall, A., & Leach, M. (2010). *Putting the politics back into public engagement: Participation, mobilisation and citizenship in shaping of health services.* Mimeo, UK: Institute of Development Studies.

Cornwall, A., & Shankland, A. (2008). Engaging citizens: Lessons from building Brazil's national health system. *Social Science and Medicine, 66*(10), 2173–2184. doi:10.1016/j.socscimed.2008.01.038

Dahlgren, G., & Whitehead, M. (2007). *Levelling up (part 2): A discussion paper on European strategies for tackling social inequities in health,* Copenhagen, Denmark: WHO Regional Office for Europe.

De Backer, S. (2012). *Mining investment and financing in Africa: Recent trends and key challenges.* Johannesburg, South Africa: Webber Wentzel.

Delany, T., Lawless, A., Baum, F., Popay, J., Jones, L., McDermott, D., . . . Marmot, M. (2016). Health in All Policies in South Australia: What has supported early implementation? *Health Promotion International, 31*(4), 888–898. doi:10.1093/heapro/dav084

European Commission (EC). (2016), Employment, social affairs and inclusion: Social protection & social inclusion. Retrieved from http://ec.europa.eu/social/main.jsp?langId=en&catId=750

Friel, S., Harris, P., Simpson, S., Bhushan, A., & Baer, B. (2015). Health in All Policies approaches: Pearls from the Western Pacific region. *Asia and the Pacific Policy Studies, 2*(2), 324–337.

Gesellschaft für Internationale Zusammenarbeit (GIZ) & World Health Organization (WHO). (2011a). *Health and human rights e-learning course. Module 1: Health and human rights norms and principles.*

Gesellschaft für Internationale Zusammenarbeit (GIZ) & World Health Organization (WHO). (2011b). *Health and human rights e-learning course. Module 2: The legal framework.*

Gilson, L. (2007). Acceptability, trust and equity. In G. Mooney & D. McIntyre D (Eds.), *The economics of health equity* (pp. 124–148). Cambridge, UK: Cambridge University Press.

Gilson, L., Doherty, J., & Loewenson, R. (2011). Challenging inequity through health systems. In J. H. Lee & R. Sadana (Eds.), *Improving equity in health by addressing social determinants* (pp. 196–230). Geneva, Switzerland: World Health Organization.

Gilson, L., Doherty, J., Loewenson, R., & Francis, V. (2008). *Challenging inequity through health systems: Final report of the Knowledge Network on Health Systems.* Geneva, Switzerland: WHO Commission on Social Determinants of Health. Retrieved from http://www.who.int/social_determinants/resources/csdh_media/hskn_final_2007_en.pdf

Global Environment Facility (GEF), Open Society Initiative for Southern Africa (OSISA), & United Nations Development Programme (UNDP). (2013). *Land, biodiversity and extractive industries in southern Africa: How effective are legal and institutional frameworks in protecting people and the environment?* Washington, DC: GEF; Johannesburg, South Africa: OSISA; & New York, NY: UNDP.

Global Witness. (2012). Extractive sector transparency: Why the EU needs a strong set of rules. Retrieved from https://www.globalwitness.org/sites/default/files/Extractive%20industry%20transparency%20briefing.pdf

Human Rights Watch (HRW). (2013). *What is a house without food? Mozambique's coal mining boom and resettlements.* New York, NY: Author.

International Institute for Environment and Development. (2002). *Breaking new ground: Mining minerals, and sustainable development.* London, UK/Sterling, VA: Earthscan Publications.

International Labour Organisation. (2014). *Tripartite declaration of principles concerning multinational enterprises and social policy (MNE Declaration)* (4th ed.). Geneva, Switzerland: Author.

Kabemba, C. (2014). *Myths and mining: The reality of resource governance in Africa.* Johannesburg, South Africa: Southern Africa Resource Watch & Open Society Initiative for Southern Africa.

Kelly, M., & Doohan, E. (2014). The social determinants of health. In M. H. Merson, R. E. Black, & A. J. Mills (Eds.), *Global health: Diseases, programs, systems and policies* (3rd ed., pp. 75–114). Burlington, MA: Jones & Bartlett Learning.

Kelly, M. P., Morgan, A., Bonnefoy, J., Butt, J., & Bergman, V. (2007). *The social determinants of health: Developing an evidence base for political action.* Final Report to World Health Organization Commission on the Social Determinants of Health from Measurement and Evidence Knowledge Network. The Measurement and Evidence Knowledge Network. Chile: Universidad del Desarrollo; United Kingdom: National Institute for Health and Clinical Excellence.

Kringos, D. S., Boerma, W. G. W., Van der Zee, J., & Groenewegen, P. (2013). Political, cultural and economic foundations of primary care in Europe. *Social Science and Medicine, 99*(0), 9–17.

Labonte, R., & Schrecker, T. (2008). *Towards health-equitable globalisation: Rights, regulation and redistribution.* Final Report to the Commission on Social Determinants of Health of the Globalisation Knowledge Network. Ottawa, Canada: University of Ottawa Institute of Population Health.

Lauthier, B. (2005). Una protección social mutualista y universal: Condición para la eficacia de la lucha contra la pobreza. In P. Salama, J. Marques-Pereira, B. Lauthier, Y. Le Bonniec, O. Rodríguez, & C. Giraldo (Eds.), *Sistemas de protección social: Entre la volatilidad económica y la vulnerabilidad social* (pp. 95–146). Bogotá, Colombia: Centro de Investigaciones para el Desarrollo (CID), Facultad de Ciencias Económicas, Universidad Nacional de Colombia (Colección estudios sobre protección social, tomo 1).

Loewenson, R. (2013a). *Evaluating intersectoral processes for action on the social determinants of health: Learning from key informants.* Social Determinants of Health Discussion Paper 5: Policy & Practice. Geneva, Switzerland: World Health Organization.

Loewenson, R. (2013b). *The Healthy Schools programme in South Africa.* Brazzaville, Republic of Congo: WHO Regional Office for Africa.

Loewenson, R. (2016, April). *Understanding and organising evidence on social power and participation in health systems.* Oxford, UK: Training and Research Support Centre.

Loewenson, R., Bambas Nolen, L., & Wamala, S. (2010). Globalisation and women's health in sub-Saharan Africa: Would paying attention to women's occupational roles improve nutritional outcomes? *Scandinavian Journal of Public Health, 38*(suppl 4), 6–17.

Loewenson, R., & Gilson, L. (2012). The health system and wider social determinants of health. In R. Smith & K. Hanson (Eds.), *Health systems in low- and middle-income countries: An economic and policy perspective* (pp. 219–242). Oxford, UK: Oxford University Press.

Loewenson, R., Hinricher, J., & Papamichail, A. (2016). *Corporate responsibility for health in the extractive sector in east and southern Africa.* EQUINET Discussion paper 108. Harare, Zimbabwe: Training and Research Support Centre & Regional Network on Equity in Health in East and Southern Africa.

Loewenson, R., Laurell, A. C., Hogstedt, C., D'Ambruoso, L., & Shroff, Z. (2014). *Participatory action research in health systems: A methods reader.* Ottawa, Canada/Geneva, Switzerland/ Harare, Zimbabwe: Training and Research Support Centre, Alliance for Health Policy and Systems Research, World Health Organization, & International Development Research Centre.

Loewenson, R., & Simpson, S. (2014). *Strengthening primary care to improve health: Learning for the USA from high- and middle-income countries.* Oxford, UK: Training and Research Support Centre.

Loewenson, R., & Simpson, S. (2015). Situational analysis on health equity and social determinants of health, Tete Province, Mozambique. Produced by TARSC in cooperation with DPS Tete and Embassy of Denmark, Mozambique. Retrieved from http://www.tarsc.org/publications/documents/Tete%20SitAn%20on%20SDHE%20Eng2015.pdf

Loewenson, R., & Whitehead, M. (2012). Robust and equity oriented health systems. Venice, Italy: WHO European Office for Investment for Health and Development.

Lusaka District Health Management Team (LDHMT) & Training and Research Support Centre (TARSC). (2015). *Health centre committee involvement in local government planning for health in Zambia.* EQUINET Case Study Brief. Harare, Zimbabwe: Regional Network on Equity in Health in East and Southern Africa.

Lusaka District Health Office (LDHO) & Training and Research Support Centre (TARSC). (2016). *Using photovoice to strengthen health centre committees as a vehicle for social participation in health system in east and southern Africa: Zambia report.* Harare, Zimbabwe: Regional Network on Equity in Health in East and Southern Africa.

Mackintosh, M. (2007, March; revised April 2008). *Planning and market regulation: Strengths, weaknesses and interactions in the provision of less inequitable and better quality health care.* Paper prepared for the Health Systems Knowledge Network of the World Health Organization's Commission on Social Determinants of Health. Retrieved from http://www.who.int/social_determinants/resources/csdh_media/planning_market_regulation_2007_en.pdf

Mackintosh, M., & Koivusalo, M. (2005). *The commercialisation of health care: Global and local dynamics and policy responses.* Basingstoke, UK: Palgrave Macmillan.

Mbwili-Muleya, C., Lungu, M., Kabuba, I., Zulu Lishandu, I., & Loewenson, R. (2008). *Consolidating processes for community–health centre partnership and accountability in Zambia: An EQUINET PRA project report.* Lusaka District Health Team and Equity Gauge Zambia, EQUINET Participatory Research Report. Harare, Zimbabwe: Regional Network on Equity in Health in East and Southern Africa.

McNab, A. (2013). The Stellenbosch consensus statement on health promoting schools. *Global Health Promotion, 20*(1), 78–81.

Micikas, M., Foster, J., Weis, A., Lopez-Salm, A., Lungelow, D., Mendez, P., & Micikas, A. (2015). A community health worker intervention for diabetes self-management among the Tz'utujil Maya of Guatemala. *Health Promotion Practice, 16*(4), 601–608.

Ministério da Planificação e Desenvolvimento (MPD). (2013). *Mozambique Integrated Growth Poles Project (P127303). Environmental and Social Management Framework (ESMF). Draft final.* Maputo, Mozambique: National Directorate of Services Planning, Ministry of Planning and Development.

Ministério de Saúde, Mozambique (MISAU). (2014). *Plano Estratégico do Sector da Saúde PESS 2014–2019.* Maputo, Mozambique: Author.

Ministry of Health Zambia, Lusaka District Health Management Team (LDHMT), & Training and Research Support Centre (TARSC). (2012). *National launch meeting of the Zambia Health Literacy Programme. Workshop report, Lusaka, 26 July 2012.* Lusaka, Zambia: LDHMT, TARSC, & Regional Network on Equity in Health in East and Southern Africa.

Mittler, J. N., Martsolf, G. R., Telenko, S. J., & Scanlon, D. P. (2013). Making sense of "consumer engagement" initiatives to improve health and health care: A conceptual framework to guide policy and practice. *Milbank Quarterly, 91*(1), 37–77.

Murombo, T. (2013). Regulating mining in South Africa and Zimbabwe: Communities, the environment and perpetual exploitation. *Law, Environment and Development Journal, 9*(1), 31–49.

Nguyen, H. T., Passmore, J., Cuong, P. V., & Nguyen, N. P. (2012). Measuring compliance with Viet Nam's mandatory motorcycle helmet legislation. *International Journal of Injury Control and Safety, 20*(2), 192–196.

Norwegian Ministry of Health and Care Services. (2007). *Report No. 20 (2006–2007) to the Storting. National strategy to reduce social inequalities in health.* Oslo, Norway: Norwegian Ministry of Health and Care Services. Retrieved from https://

www.regjeringen.no/contentassets/bc70b9942ea241cd90029989bff72d3c/en-gb/pdfs/stm200620070020000en_pdfs.pdf

Ojeda, G., & Murad, R. (2005). Salud sexual y reproductiva en zonas marginals: Situación de las mujeres desplazadas 2005. Bogotá, Colombia: Profamilia, USAID.

Ollila, E., Baum, F., & Peña, S. (2013). Introduction to Health in All Policies and the analytical framework of the book. In K. Leppo, E. Ollila, S. Peña, M. Wismar, & S. Cook (Eds.), *Health in All Policies: Seizing opportunities, implementing policies* (pp. 3–24). Helsinki, Finland: Ministry of Social Affairs and Health.

O'Neill, J., Tabish, H., Welch, V., Petticrew, M., Pottie, K., Clarke, M., . . . Tugwell, P. (2014). Applying an equity lens to interventions: Using PROGRESS ensures consideration of socially stratifying factors to illuminate inequities in health. *Journal of Clinical Epidemiology, 67*(1), 56–64.

Oxman, A., Lavis, J., Lewin, S., & Fretham, A. (2009). Support tools for evidence-informed health. Policymaking (STP) 10: Taking equity into consideration when assessing the findings of a systematic review. *Health Policy Research and Systems, 7* (Suppl 1), S10.

Palència, L., Malmusi, D., & Borrell, C. (2014). *Incorporating intersectionality in evaluation of policy impacts on health equity: A quick guide.* Barcelona, Spain: Agéncia de Salut Pública de Barcelona, CIBERESP, SOPHIE.

Palmary, I. (2015). Reflections on social cohesion in contemporary South Africa. *Psychology in Society, 49*, 62–69. Retrieved from http://www.scielo.org.za/pdf/pins/n49/05.pdf

Passmore, J., Tu, N. T. D., Luong, M. A., Chinh, N. D., & Nam, N.P. (2010). Impact of mandatory motorcycle helmet wearing legislation on head injuries in Viet Nam: Results of preliminary analysis. *Traffic Injury Prevention, 11*(2), 202–206.

Passmore, J., Nguyen, L. H., Nguyen, P. N., & Olivé, J.-M. (2010). The formulation and implementation of a national helmet law: A case study from Viet Nam, *Bulletin of the World Health Organization, 88*, 783–787.

Pennington, A., & Whitehead, M. (2014). *Learning from promising primary care practice models for the USA: Country case study UK: With a focus on England.* Liverpool, UK: Training and Research Support Centre & University of Liverpool.

Perez Jarauta, M., Goya Arive, M. A., & Merino Merino, B. (2010). Spain: Health promotion among Navarre ethnic minorities programmed. In T. Koller (Ed.), *Poverty and social exclusion in the WHO European Region: Health systems respond.* Copenhagen, Denmark: WHO Regional Office for Europe. Retrieved from http://www.euro.who.int/__data/assets/pdf_file/0006/115485/E94018.pdf

Popay, J., Escorel, S., Hernández, M., Johnston, H. B., Mathieson, J., & Rispel, L. (2011). Social exclusion and health inequalities: Definitions, policies and actions. In J. H. Lee & R. Sadana (Eds.), *Improving equity in health by addressing social determinants.* pp. 88-115. Geneva, Switzerland: World Health Organization.

Pronyk, P., Hargreaves, J., Kim, J., Morison, L., Phetla, G., Watts, C., . . . Porter, J. D. (2006). Effect of structural intervention for the prevention of intimate partner violence and HIV in rural South Africa: a cluster randomised trial. *Lancet, 368*(9551), 1973–1983.

Public Health Agency of Canada (PHAC). (2007). *Crossing sectors: Experiences in intersectoral action, public policy and health.* Paper prepared in collaboration with the Health Systems Knowledge Network of the WHO Commission on Social Determinants of Health and EQUINET. Ottawa, Canada: Public Health Agency of Canada.

Rasanathan, K. (2011). *Closing the gap: Policy into practice on social determinants of health: Discussion paper for the World Conference on Social Determinants of Health.* Geneva, Switzerland: World Health Organization.

Rede Brasil de Direitos Humanos. (n.d.). Curso sistematico de derechos humanos [Systematic course of human rights]. Online course by Instituto de Estudios Politicos para America Latina y Africa. Retrieved from http://www.dhnet.org.br/dados/cursos/edh/interdisciplinario/ddhh_c.htm

Regional Network on Equity in Health in East and Southern Africa (EQUINET). (2012). *Regional Equity Watch 2012: Assessing progress towards equity in health in East and Southern Africa.* Harare, Zimbabwe: Author.

Regional Network on Equity in Health in East and Southern Africa (EQUINET) Steering Committee (SC). (2007). *Reclaiming the resources for health: A regional analysis of equity in health in east and southern Africa.* Harare, Zimbabwe/Kampala, Uganda/Johannesburg, South Africa: EQUINET, Weaver Press, Fountain Publishers, & Jacana Media.

Republic of Mozambique, Provincial Government of Tete, Provincial Health Directorate, with Embassy of Denmark and Training and Research Support Centre (TARSC). (2016). *Tackling the social determinants of health equity in Tete Province, Mozambique.* Mozambique: DPS Tete.

Rispel, L., Molomo, B., & Dumela, S. (2008). *South African case study on social exclusion: Social Exclusion Knowledge Network Background Paper No. 3.* Johannesburg, South Africa.

Sadana, R., Simpson, S., Popay, J., Albrecht, D., Hosseinpoor, A. R., & Kjellstrom, T. (2011). Strengthening efforts to improve health equity. In J. H. Lee & R. Sadana (Eds.), *Improving equity in health by addressing social determinants* (pp. 7–22). Geneva, Switzerland: World Health Organization.

Salinas, G., & Haacker, M. (2006). HIV/AIDS: The impact on poverty and inequality. IMF Working paper No. 06/126. Retrieved from http://www.imf.org/en/publications/wp/issues/2016/12/31/hiv-aids-the-impact-on-poverty-and-inequality-19175

Salvucci, V. (2014). *District poverty maps for Mozambique: 1997 and 2007.* Maputo, Mozambique: Mimeo.

Sen, G., & Ostlin, P. (2011). Gender inequity in health. In J. H. Lee & R. Sadana (Eds.), *Improving equity in health by addressing social determinants* (pp. 59–87). Geneva, Switzerland: World Health Organization.

Shankardass, A., Solar, O., Murphy, K., Greaves, L., & O'Campo, P. (2012). A scoping review of intersectoral action for health equity involving governments. *International Journal of Public Health, 57*(1), 25–33.

Shankardass, A., Solar, O., & O'Campo, P. (2012, November). *WHO Database Intersectoral Action for Health Equity Case Studies. Draft WHO Database Update Protocol, Version 1.7* (rev2).

SHaPeS Thematic Working Group of Health Systems Global, Regional Network on Equity in Health in East and Southern Africa (EQUINET), & Emerging Voices for Global Health; Daniels, K., Loewenson, R., & 68 other signatories. (2016). Fair publication of qualitative research in health systems: A call by health policy and systems researchers. *International Journal for Equity in Health, 15*, 98. doi:10.1186/s12939-016-0368-y.

Shelton, G., & Kabemba, C. (Eds.). (2012). *Win–win partnership? China, Southern Africa and the extractive industries.* Johannesburg, South Africa: Southern Africa Resource Watch.

Simpson, S., Kelly, M. P., & Morgan, A. (2013). Defining principles for good practice: Using case studies to inform health systems

action on health inequalities. *Evaluation and Program Planning, 36,* 191–197.

Simpson, S., Mahoney, M., Harris, E., Aldrich, R., & Williams, S. J. (2005). Equity-focused health impact assessment: A tool to assist policy makers in addressing health inequalities. *Environmental Impact Assessment Review, 25,* 772–782.

Solar, O., & Irwin, A. (2010). *A conceptual framework for action on the social determinants of health.* WHO Discussion Paper 2 (Policy and Practice), Geneva, Switzerland: World Health Organization.

Southern African Development Community (SADC). (2003) *SADC HIV/AIDS framework and strategic programme of action 2003–2007.* Gaborone, Botswana: Author.

Stronks, K., & Mackenbach, J. P. (2005). Evaluating the effects of policies and interventions to address inequalities in health: Lessons from a Dutch programme. *European Journal of Public Health, 16*(4), 346–353.

Training and Research Support Centre (TARSC). (2014). Strengthening primary care in the USA to improve health: Learning from high- and middle-income countries. Retrieved from http://www.tarsc.org/publications/documents/Learning%20on%20PC%20from%20HMICs%20TARSC%20RWJF.pdf

Turrell, G., Oldenburg, B., McGuffog, I., & Dent, R. (1999). *Socioeconomic determinants of health: Towards a national research program and a policy and intervention agenda.* Canberra, Australia: Queensland University of Technology, School of Public Health & Ausinfo.

UNICEF. (2014). *Ending child marriage: Progress and prospects.* New York, NY: Author.

UNICEF global databases. (2016). Based on Demographic and Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS), and other nationally representative surveys, 2008–2014. Retrieved from https://data.unicef.org/topic/child-protection/child-marriage/

United Nations. (1948). *Universal Declaration of Human Rights. Adopted and proclaimed by General Assembly resolution 217 A (III) of 10 December 1948.* New York, NY: Author.

United Nations. (1976). The International Covenant on Economic, Social and Cultural Rights. Retrieved from http://www.unhchr.ch/html/menu3/b/a_cescr.htm

United Nations. (2000). General Comment No 14: The Right to the Highest Attainable Standard of Health Committee on Economic, Social, and Cultural Rights. Twenty-second Session, 25 April–12 May 2000, Geneva, Switzerland: Author.

United Nations Human Rights Based Approach (UNHRBA). (2003). The human rights based approach to development cooperation: Towards a common understanding among UN agencies. Retrieved from http://hrbaportal.org/the-human-rights-based-approach-to-development-cooperation-towards-a-common-understanding-among-un-agencies

University of Western Cape. (2006). Creating a decade of health promoting schools, strengthening whole school development: Executive summary report on the National Conference on Health Promoting Schools held at the University of Western Cape, Bellville, Western Cape, South Africa, 14–16 September 2006.

von der Goltz, J., & Barnwal, P. (2014). *Mines: The local wealth and health effects of mining in developing countries.* Working paper. New York, NY: School of International and Public Affairs, Columbia University.

Wallerstein, N. (2006). *What is the evidence on effectiveness of empowerment to improve health?* Copenhagen, Denmark: WHO Regional Office for Europe.

Whiting, D., Unwin, N., & Roglic, G. (2010). Diabetes: Equity and social determinants. In E. Blas & A. Sivisankara Kurup (Eds.), *Equity, social determinants and public health programmes.* pp. 77-84. Geneva, Switzerland: World Health Organization.

WHO Europe. (2013). *Health 2020: A European policy framework and strategy for the 21st century.* Copenhagen, Denmark: World Health Organization.

WHO Regional Office for Europe (WHO Europe). (2011). *Developing the new European policy for health 2020.* Concept paper. First meeting of the European Health Policy Forum for High-Level Government Officials, Andorra, 9–11 March 2011. Retrieved from http://www.ndphs.org/documents/2506/Health2020_European%20Health%20Policy%20formulation_eng.pdf

World Commission on the Social Dimensions of Globalisation. (2004). *A fair globalisation: Creating opportunities for all.* Geneva, Switzerland: International Labour Organisation

World Health Organization (WHO). (2005). Sustainable health financing, universal coverage and social health insurance. World Health Assembly Resolution 58.33, Geneva, Fifty-eighth World Health Assembly, 16–25 May 2005. Retrieved from http://apps.who.int/medicinedocs/documents/s21475en/s21475en.pdf

World Health Organization (WHO). (2006). *Constitution of the World Health Organisation.* Geneva, Switzerland: Author.

World Health Organization (WHO). (2008). *Primary health care: Now more than ever.* Geneva, Switzerland: Author.

World Health Organization (WHO). (2011). *Gender mainstreaming for health managers: A practical approach. Facilitators' guide.* Paris, France: Author.

World Health Organization (WHO). (2013a). *Demonstrating a health in all policies analytic framework for learning from experiences: Based on literature reviews from Africa, South-East Asia and the Western Pacific.* Geneva, Switzerland: Author.

World Health Organization (WHO). (2013b). *Handbook on health inequality monitoring with a special focus on low- and middle-income countries.* Luxembourg: Author.

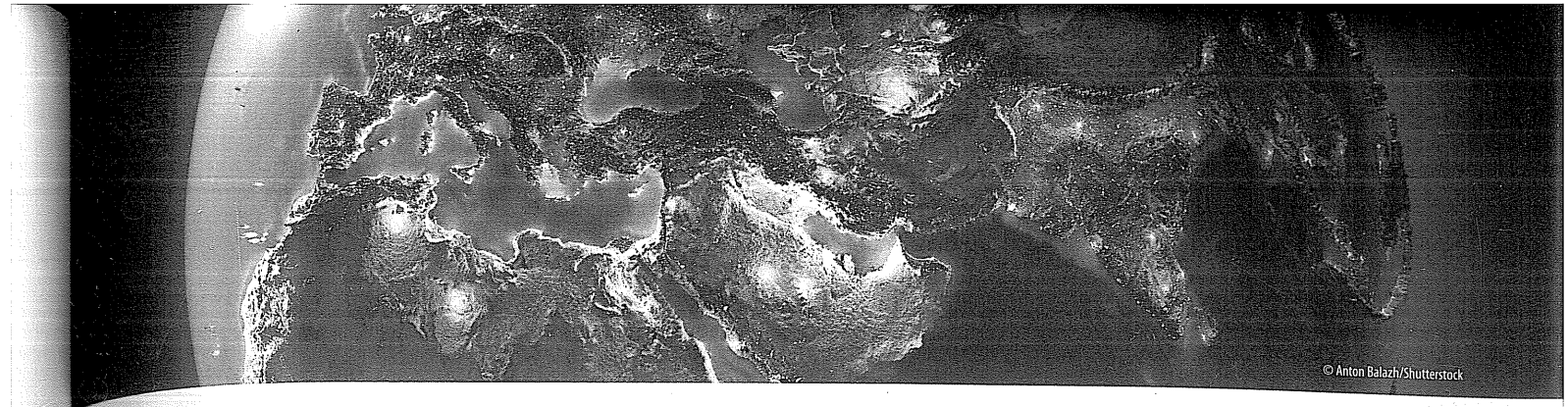
World Health Organization (WHO). (2014, September). Adolescent pregnancy. Fact Sheet No. 364. Retrieved from http://www.who.int/mediacentre/factsheets/fs364/en/

World Health Organization (WHO). (2015). What is health in all policies? [Infographic on air pollution]. Retrieved from http://who.int/social_determinants/publications/health-policies-manual/HiAP_Infographic.pdf?ua=1

World Health Organization (WHO). (2016). *Innov 8: The Innov8 approach for reviewing national health programmes to leave no one behind.* Geneva, Switzerland: Author

World Health Organization (WHO). (2017a). Social Determinants of Health Sectoral Briefing Series. Retrieved from http://www.who.int/social_determinants/corner/en/

World Health Organization Regional Office for Europe. (2016). *Women's health and well-being in Europe: Beyond the mortality advantage.* Copenhagen, Denmark: Author.



CHAPTER 8

Chronic Diseases and Risks

Gillian P. Christie, Sandeep P. Kishore, David J. Heller, and Derek Yach

DISCLOSURE STATEMENT

Statements made and opinions expressed in this chapter are those of the authors and should not be construed as representing an official position of the organizations where the authors are employed.

Introduction

In the 1920s, Yale University's Charles-Edward Amory Winslow taught that the goal of each generation was to redefine the unacceptable. With chronic diseases now arguably "the social justice issue of our generation," this chapter intends to redefine the unacceptable by building a renewed case on the imperative to invest in and advocate for chronic disease prevention (Horton, 2015). It calls for young professionals and continuing students to engage in sustained and coordinated actions to combat the growing burden of chronic disease on global populations.

This chapter covers three objectives: (1) define and outline the global prevalence of chronic diseases, their health and economic impact, and their four key risk factors; (2) describe stakeholder efforts to date in chronic disease prevention; and (3) propose stakeholder actions—both policies and systems of care—that can further control the rising prevalence of chronic diseases.

The Burden of Chronic Disease: Causes and Impacts

Defining Chronic Diseases

At its founding in 1946, the World Health Organization (WHO) defined health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity." At that time, most human death and disease was due to acute, infectious diseases from which people either recovered or died. Today, chronic conditions—those that cause illness gradually over the course of many months or years—have become the leading cause of human disability and death. Chronic diseases are among the greatest threats to the state of global human health that WHO was founded to protect.

Chronic diseases often emerge in middle age, after a long exposure to adverse social, environmental, genetic, behavioral, and lifestyle factors. Such diseases can affect the young and healthy—including children—and can emerge quickly and without warning. For example, an adolescent newly diagnosed

with type 1 diabetes and a seemingly healthy young woman who suffers an acute stroke due to undiagnosed high blood pressure both suffer from chronic disease. In affluent countries as well as in low- and middle-income countries (LMICs), chronic diseases often disproportionately affect lower-income persons and communities. Although most chronic conditions are not "infectious" in the typical sense, emerging evidence suggests that chronic conditions such as diabetes and atherosclerotic cardiovascular disease tend to cluster in families and communities with common lifestyle and environmental risk factors. These risk factors can *transmit* disease from one person to another in a social unit through shifts in behavior.

Despite their many forms, most chronic diseases have common underlying characteristics. These include a few common risk factors that act independently and synergistically; a long latency between cumulative exposure to risk and disease outcomes; a high degree of preventability; a low cure rate, necessitating decades of treatment and care coordination; considerable comorbidity; and strong linkages to poverty and socioeconomic development. Chronic diseases are predominantly caused by noninfectious risk factors, but can be caused or exacerbated by infection as well. The leading chronic diseases include cardiovascular disease, stroke, chronic respiratory diseases, cancer, diabetes, human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS), mental illness, and traumatic injury. Fortunately, all of these conditions—and the morbidity and mortality they cause—are preventable and treatable through policies and programs that treat a few common risk factors, such as unhealthy diet, tobacco use, physical inactivity, and alcohol and other substance misuse.

Epidemiology of Chronic Diseases: Rising Risk

In the past 100 years, chronic and largely noncommunicable diseases have silently overtaken infectious diseases as the leading cause of death and disability worldwide (Stuckler, 2011). Initially proposed by Abdel Omran in 1971, this "epidemiologic transition" to chronic, noncommunicable diseases began in the early twentieth century in high-income countries such as the United States. Pneumonia, tuberculosis, and gastrointestinal infections were the leading killers in 1900, and by the early twenty-first century had spread to lower-income countries. This transition, which is largely due to improvements in sanitation, vaccination, and antibiotics that significantly curbed disease and death from infection, increased global life expectancy from 61.7 years in 1980 to 71.8 years in 2015. Nevertheless, achieving further advances in longevity will require a different approach, as human life expectancy now chiefly depends on the growing toll of chronic diseases (Global Burden of Disease [GBD] Collaborators, 2016). Each year, chronic diseases kill an estimated 39 million people, with cardiovascular diseases the leading cause of death (17.9 million people), followed by cancers (8.8 million people) and respiratory diseases (3.8 million people) (GBD Collaborators, 2016). Most of these deaths (approximately 28 million) occur in LMICs (WHO, 2017b). **TABLE 8-1** identifies the 10 leading causes of death globally based on income, while **TABLE 8-2** indicates changes in deaths from chronic diseases over time.

Individual Risk Factors for Chronic Disease. A few common, modifiable behavioral risk factors accumulate over the lifespan and drive the majority of all

TABLE 8-1 The Ten Leading Causes of Deaths in the World, and in Low-, Middle-, and High-Income Countries, 2015

Disease or Injury	Deaths (per 100,000)	Percentage Change (1990–2015)	Disease or Injury	Deaths (per 100,000)	Percentage Change (1990–2015)
World			*Low-Income Countries*		
1. Cardiovascular diseases	243.1	2.4	1. Lower respiratory infections	80.4	−52.5
2. Neoplasms	118.9	11.0	2. Malaria	64.5	−64.1
3. Diarrhea/lower respiratory infections/other	67.3	−55.4	3. Diarrheal diseases	59.0	−66.1
4. Chronic respiratory	51.5	−22.4	4. Ischemic heart disease	47.9	−4.6

Disease or Injury	Deaths (per 100,000)	Percentage Change (1990–2015)	Disease or Injury	Deaths (per 100,000)	Percentage Change (1990–2015)
5. Diabetes/urogenital/ blood/endocrine diseases	46.3	44.1	5. HIV/AIDS	44.5	76.4
6. HIV/AIDS and tuberculosis	31.3	–7.5	6. Tuberculosis	33.6	–43.9
7. Neurologic disorders	30.7	46.8	7. Hemorrhagic stroke	29.2	–18.0
8. Neonatal disorders	29.4	–55.7	8. Neonatal preterm birth complications	23.4	–51.2
9. Unintentional injuries	25.0	–31.5	9. Neonatal encephalopathy due to birth asphyxia and trauma	21.9	–43.2
10. Transport injuries	19.9	–12.7	10. Protein-energy malnutrition	21.6	–66.5
Middle-Income Countries			*High-Income Countries*		
1. Cardiovascular diseases	237.0	25.3	1. Ischemic heart disease	193.1	–16.0
2. Neoplasms	100.0	24.6	2. Alzheimer's disease	71.2	66.3
3. Chronic respiratory	61.3	–26.0	3. Ischemic stroke	65.5	–15.8
4. Diabetes/urogenital/ blood/endocrine diseases	46.4	59.0	4. Lung cancer	51.4	12.2
5. Diarrhea/lower respiratory infections/other	42.2	–64.9	5. Lower respiratory infections	39.7	30.2
6. HIV/AIDS and tuberculosis	24.4	–29.1	6. Chronic obstructive pulmonary disease	37.4	12.1
7. Transport injuries	23.8	–2.0	7. Hemorrhagic stroke	35.4	–15.8
8. Unintentional injuries	22.5	–42.8	8. Colorectal cancer	28.8	15.6
9. Neonatal disorders	19.2	–69.2	9. Diabetes	18.9	17.6
10. Cirrhosis	18.7	3.1	10. Self-harm	18.2	1.1

Data from Institute of Health Metrics and Evaluation (IHME) at the University of Washington, 2015.

TABLE 8-2 Changes in Deaths from Selected Chronic Diseases, 2005–2015

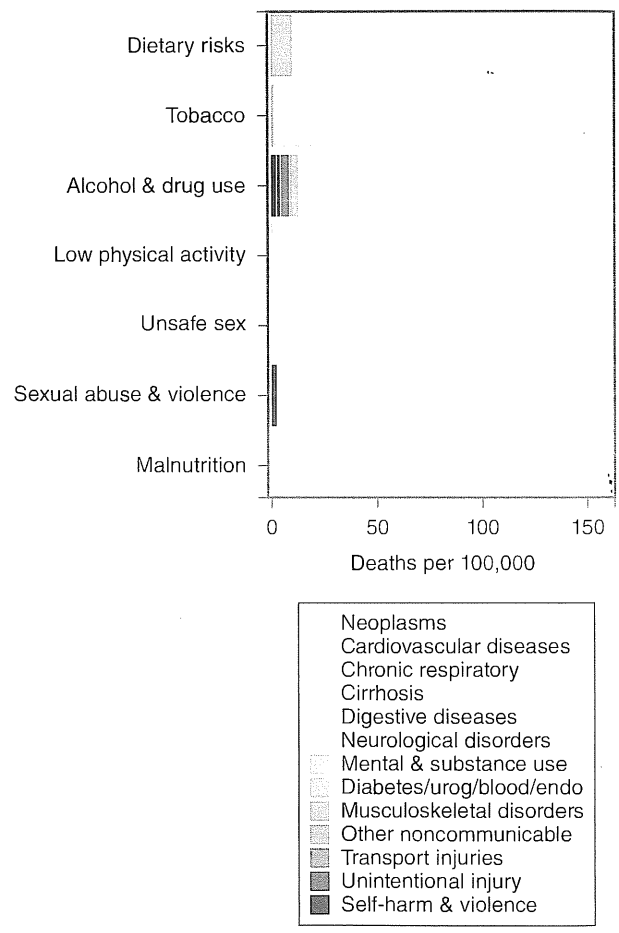
Chronic Disease	Deaths, 2005 (thousands)	Deaths, 2015 (thousands)	Percent Change (%)
Overall	34,835.6	39,804.2	14.3
Neoplasms	7,492.8	8,764.6	17.0
Cardiovascular diseases	15,933.7	17,921.0	12.5
Chronic respiratory diseases	3,709.1	3,795.5	2.3
Neurologic disorders	1,671.0	2,258.9	35.2
Mental and substance use disorders	305.9	324.9	6.2
Drug use disorders	128.8	169.9	31.8
Diabetes, urogenital, blood, and endocrine diseases	2,635.3	3,409.3	29.4
Musculoskeletal disorders	76.2	90.1	18.2

Note: Between 2005 and 2015, global deaths from chronic diseases increased by 14.3%. The greatest changes were in neurologic disorders; drug use disorders; and diabetes, urogenital, blood, and endocrine diseases.

chronic disease, from diabetes to cancer to cardiovascular conditions (**FIGURE 8-1** and **FIGURE 8-2**). These include unhealthy diet, tobacco use, abuse of alcohol and other substances, and low physical activity (**TABLE 8-3**). Chronic disease is also preventable through adherence to prescription medications and promotion of mental well-being, among other factors. Collectively, these risk factors drive a substantial portion (up to 60%) of the global burden of disease, both directly and by causing other risk factors for chronic disease such as elevated cholesterol, glucose, and blood pressure levels.

To explain the shift in chronic diseases from affluent countries, and predict its onset in LMICs, Omran conceptualized three stages of disease epidemiology: pestilence and famine, receding epidemics, and degenerative and human-made chronic diseases. Three major sets of determinants drive the transition toward the third "chronic disease" stage in each country: ecobiologic changes; socioeconomic, political, and cultural changes; and medical and public health interventions. Omran correctly predicted that chronic diseases would eventually impose a greater burden in all countries in the coming decades. In practice, however, chronic diseases have not displaced acute infectious diseases in LMICs. Rather, these countries suffer from a polarized and protracted double, triple, or quadruple burden of disease (Frenk, Bobadilla, Sepúlveda & Cervantes, 1989; Mayosi et al., 2009).

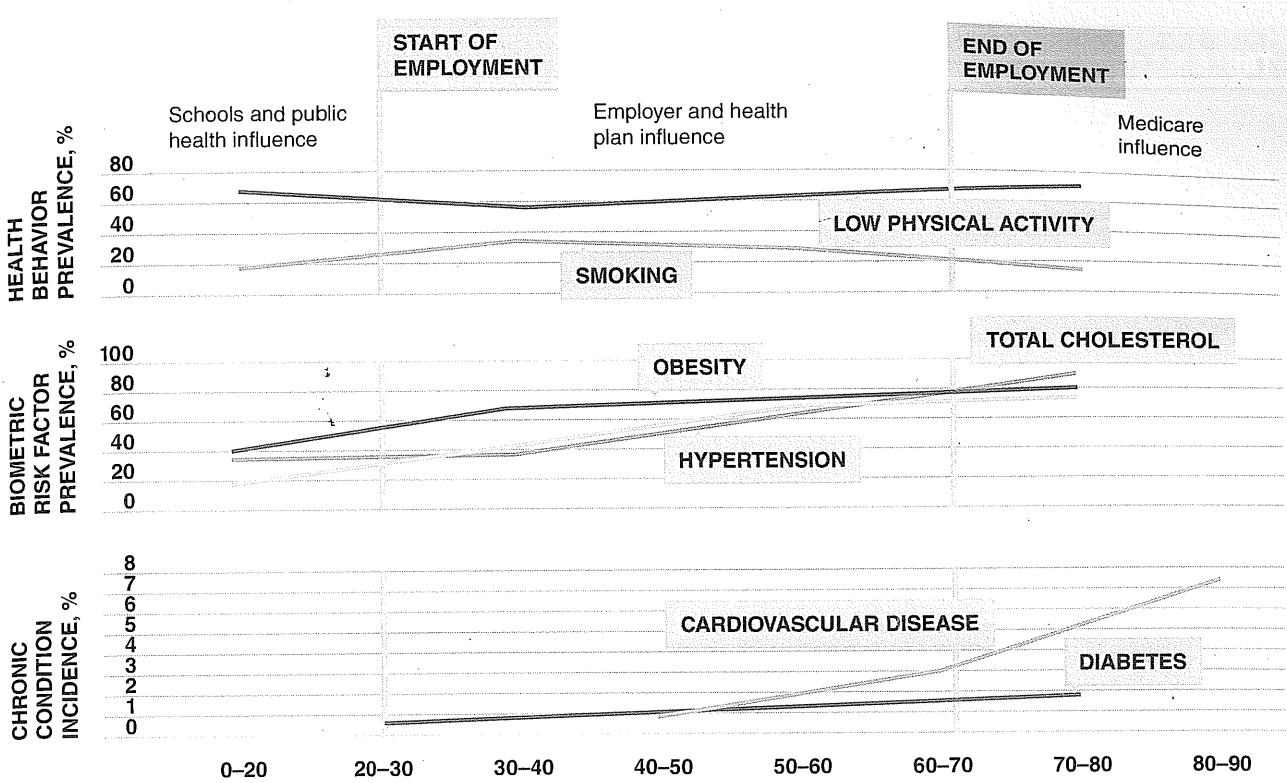
The four major chronic disease risk factors presented in Figure 8-1 are leading causes of the changes Omran described, especially with respect to



Note: *Four modifiable risk factors – dietary risks, tobacco, alcohol and drug use, and low physical activity – contribute to a significant majority of chronic diseases globally. Figure represents both sexes, all ages, 2015.*

FIGURE 8-1 Risk factors contributing to chronic diseases.

Reproduced from Institute for Health Metrics and Evaluation (IHME). (2017). *GBD Compare.* Seattle, WA: IHME, University of Washington. Available from https://vizhub.healthdata.org/gbd-compare/



Note: As behavioral risk factors build up over the life course, they can lead to chronic diseases later in life. In many countries, governments bear the burden of costly treatments for debilitating diseases at the end of life.

FIGURE 8-2 Risk accumulation over the lifespan.

Reproduced from Vitality Institute Commissioners. (2014). *Investing in prevention: A national imperative.* Retrieved from: http://thevitalityinstitute.org/commission.

TABLE 8-3 Ranking of Risk Factors: Ten Leading Risk Factor Causes of Death by Income Group, 2015

Risk Factor	Deaths (per 100,000)	Percentage Change (1990–2015)	Risk Factor	Deaths (per 100,000)	Percentage Change (1990–2015)
World			*Low-Income Countries*		
1. High systolic blood pressure	145.2	7.1	1. Child wasting	77.9	–73.0
2. Smoking	86.9	–8.2	2. High systolic blood pressure	76.4	–9.2
3. High fasting plasma glucose	71.1	39.2	3. Household air pollution	75.6	–42.4
4. High total cholesterol	58.5	0.2	4. Unsafe sex	70.5	11.7
5. Ambient particulate matter pollution	57.5	–12.2	5. Unsafe water source	53.3	–65.7
6. Diet high in sodium	56.0	7.2	6. Unsafe sanitation	40.1	–66.5

(continues)

TABLE 8-3 Ranking of Risk Factors: Ten Leading Risk Factor Causes of Death by Income Group, 2015 *(continued)*

Risk Factor	Deaths (per 100,000)	Percentage Change (1990–2015)	Risk Factor	Deaths (per 100,000)	Percentage Change (1990–2015)
World			*Low-Income Countries*		
7. High body mass index	53.7	28.3	7. Ambient particulate matter	39.9	–42.7
8. Diet low in whole grains	42.6	4.3	8. No access to hand-washing facility	37.1	–62.0
9. Diet low in fruits	39.7	2.9	9. Child underweight	29.1	–77.6
10. Household air pollution from solid fuels	38.7	–39.2	10. High fasting plasma glucose	28.2	2.2
Middle-Income Countries			*High-Income Countries*		
1. High systolic blood pressure	147.4	42.0	1. High systolic blood pressure	199.3	–17.2
2. Smoking	86.2	12.8	2. Smoking	139.6	–12.0
3. Diet high in sodium	74.9	23.6	3. High total cholesterol	100.3	–23.1
4. High fasting plasma glucose	72.9	66.0	4. High fasting plasma glucose	87.5	3.7
5. Ambient particulate matter	62.2	–1.95	5. High body mass index	84.3	3.9
6. High total cholesterol	49.5	53.8	6. Diet low in whole grains	50.0	–16.5
7. High body mass index	48.5	86.8	7. Diet high in sodium	47.6	–14.4
8. Diet low in whole grains	46.9	28.3	8. Ambient particulate matter	46.0	–19.3
9. Diet low in fruits	44.1	21.1	9. Low glomerular filtration	44.8	4.8
10. Household air pollution	40.2	–43.6	10. Diet low in fruits	43.8	–14.6

Countries grouped by socio-demographic index as per IHME classifications.
Data from Institute of Health Metrics and Evaluation (IHME) at the University of Washington, 2015.

socioeconomic, political, and cultural determinants of health. For example, rates of cigarette smoking and other tobacco use have declined in many high-income countries due in part to increased awareness of the chronic disease risks associated with this factor. Nonetheless, tobacco use has risen steadily in many lower-income countries—countries where tobacco was previously either unaffordable or unavailable, or fell outside local cultural norms. As a result, WHO (2017c) estimates that 80% of the world's 1 billion smokers now live in LMICs. Similar transitions have been reported in consumption of energy-dense, low-nutrition foods, as well as use of alcohol and other recreational substances. Although the causes of these shifts are complex, increasing disposable income, increasing contact with high-income countries and

their cultural norms, and aggressive marketing from food, beverage, alcohol, and tobacco industries all play a role in their emergence.

Macro Determinants of Chronic Disease. Chronic diseases are caused by multiple individual-level risk factors, and are also driven by health determinants at the level of entire economies and societies. These factors often correlate with levels of economic development, but society does not need to wait for rapid economic growth to take action against chronic diseases (see Exhibit 8-6, "Eight Myths of Chronic Disease Burden and Control," later in this chapter).

Global Population Aging

Populations around the world are living longer due to two demographic changes: (1) increases in life expectancy among older adults and (2) declines in fertility rates among younger adults. In 2015, the average life expectancy at birth was 71.4 years of age. Babies born in the year 1900 would not normally live beyond age 50 (National Institute on Ageing, 2011). Since then, scientific and behavioral advances, such as reductions in maternal mortality in childbirth, childhood undernutrition, and poor access to safe drinking water and sanitation, have driven the increases in life expectancy and led to a better understanding of the epidemiology underlying modifiable prevention risk factors. Discoveries such as advances in antibiotics and vaccines, as well as screening tools, have yielded more recent health gains.

It is expected that the global population age 60 and older will increase from 900 million in 2015 to 2 billion in 2050, increasing this group's share from 12% to 22% of the global population. The size of this population will also surpass the number of children younger than age 5 by 2020 (WHO, 2015a). Japan is the first country where the proportion of older adults exceeds 30%, but most of North America, Europe, China, and Russia will follow suit by 2050 (WHO, 2015b).

Despite people living longer, they are living longer in poorer health. James Fries's Compression of Morbidity Hypothesis proposes that with public health intervention, "the age of onset of chronic illness may be postponed more than the age at death, squeezing most of the morbidity in life into a shorter period with less lifetime disability." In other words, a larger proportion of life can be healthy. Many countries, however, have failed to follow this trend (Fries, Bruce, & Chakravarty, 2011). In the United States, life expectancy increased from 75.2 years to 78.2 years (3 years) between 1990 and 2010, though healthy life expectancy increased by only 2.3 years, from 65.8 years to 68.1 years (Salomon et al., 2013). Thus, longer life does not necessarily mean more freedom from chronic disease.

Globalization and Trade

Following World War II, nations signed the General Agreement on Tariffs and Trade (GATT) to coordinate international trade agreements. Between 1948 and the early 1990s, tariffs on trading products declined from 40% to 4%. GATT was eventually replaced with the World Trade Organization (WTO) in 1995.

Global trade agreements impact the cost of goods sold in a given country. Based on price differentials (and cultural preferences), the type and quantity of products and services vary among countries, and their trade can impact chronic disease risks. Production of palm oil, for example, takes place largely in Southeast Asia (led by Indonesia and Malaysia) and requires large-scale tropical rainforest deforestation. Palm oil contributes to many chronic diseases, including heart diseases and type 2 diabetes. Despite the health and environmental concerns, palm oil is produced inexpensively and sold on the international market, where it appears in packaged foods as well as toothpaste and detergent. The World Wildlife Fund estimates that 50% of packaged goods sold in supermarkets contain palm oil. Unregulated global trade agreements permit continued production and consumption of palm oil, despite the product's clear contributions to poor health and environmental damage (Yach et al., 2010).

Agricultural Subsidies

Governments provide agricultural subsidies to farmers to their boost incomes and influence the cost and supply of selected commodities. In many countries, agricultural policies are not aligned with health goals. The United States, for example, offers the majority of its agricultural subsidies to producers of grains, livestock, and dairy products. This leads to a surplus of these commodities and shortages of other foods such as fruits and vegetables. Farmers are penalized for growing "specialty crops," including fruits and vegetables, if they have received subsidies for planting other crops.

Despite evidence that fruits and vegetables prevent chronic disease, there is an estimated 22% supply shortage in the amount of fruits and vegetables needed for the world's population to meet their daily recommended servings, due in part to policies that penalize their cultivation (Siegel, Ali, Srinivasiah, Nugent, & Narayan, 2014). Meanwhile, subsidized unhealthy commodities such as grains, meats, and dairy, which are often found in low-nutrition, high-calorie "junk" foods, are over-produced.

Categories of Chronic Disease

This section details leading types of chronic disease that emerge from preventable risk factors. Each major category of chronic disease is described in terms of the trends in its prevalence and severity. These categories include neoplasms; cardiovascular diseases; chronic respiratory diseases; diabetes, urogenital, blood, and endocrine diseases; neurologic, mental, and substance use disorders; and musculoskeletal disorders.

Quantifying Chronic Disease: Deaths and Years of Life Lost

Measurement of health in across high-, middle-, and low-income countries has centered on deaths, years of life lost (YLLs), and disability-adjusted life years (DALYs) (**EXHIBIT 8-1**).

Neoplasms

Neoplasms include all benign and malignant cancers, which are caused by uncontrolled growth of cells that invade and spread to distant sites of the body (WHO, 2016a). The global prevalence of neoplasms increased by 17% between 2005 and 2015 (**TABLE 8-4**). This trend is largely due to preventable changes in lifestyle (e.g., sedentary behavior, tobacco, and alcohol use) associated with cancer as well as exposure to environmental pollutants and toxins that cause cancer. In men, the leading neoplasms causing death are lung, prostate, colorectal, stomach, and liver cancers. For women, they include breast, colorectal, lung, uterine, cervix, and stomach cancers (WHO, 2016a).

Recent data estimate that 30% of cancer deaths could be prevented by modifying underlying risk factors. Beyond behavioral risks, regular preventive screenings can assist with early detection by

EXHIBIT 8-1 Mortality Versus YLLs Versus DALYs

- **Mortality:** Measure of the number of deaths within a given population.
- **Years of life lost (YLLs):** Measure that estimates the average number of years a person would have lived if he or she had not died prematurely. Incorporates the age at which death occurs by weighing more heavily deaths at a younger age.
- **Disability-adjusted life years (DALYs):** Measure of the time lived with disability combined with the time lost due to premature mortality.

TABLE 8-4 Changes in Global Deaths from Selected Neoplasms, 2005–2015

Neoplasm	All-Age Deaths, 2005 (thousands)	All-Age Deaths, 2015 (thousands)	Percentage Change, 2005–2015 (%)
Overall	7,492.8	8,764.6	17.0
Esophageal cancer	459.3	439.0	–4.4
Stomach cancer	824.5	818.9	–0.7
Colon and rectum cancer	675.5	832.0	23.2
Liver cancer	726.7	810.5	11.5
Tracheal, bronchus, and lung cancer	1,434.5	1,722.5	20.1
Nonmalignant skin cancer	36.3	51.9	42.9
Breast cancer	439.8	533.6	21.3
Ovarian cancer	133.8	161.1	20.4
Prostate cancer	277.4	365.9	31.9
Brain and nervous system cancer	190.4	228.8	20.1

Data from Global Burden of Disease (GBD) Collaborators. (2016). Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: A systematic analysis for the Global Burden of Disease Study 2015. *The Lancet, 388* (10053), 1459–1544.

identifying abnormal cells that may develop into cancer, improving the effectiveness of treatment on survival (Vitality Institute, 2016).

Cardiovascular Diseases

Cardiovascular diseases are the leading cause of death globally. These include diseases of the heart vessels and valves, such as ischemic heart disease and rheumatic heart disease, as well as diseases involving other blood vessels, such as cerebrovascular disease, hypertensive heart disease, and peripheral arterial disease (WHO, 2016b). Between 2005 and 2015, global deaths from cardiovascular diseases increased by 12.5%, with the greatest percent increases due to hypertensive and ischemic heart diseases (**TABLE 8-5**).

Cardiovascular diseases are largely preventable through interventions that target behavioral risk factors. Many of these risk factors are similar to those for neoplasms and cancer, including sedentary behavior, diets poor in fruits and vegetables, and tobacco use. These behavioral risks, in addition to nonmodifiable risk factors such as male gender and advanced age, contribute to development of silent chronic conditions that culminate in overt cardiovascular disease—for example, high blood pressure, elevated cholesterol levels, and elevated fasting glucose levels. Approximately 75% of all cases of cardiovascular diseases occur in LMICs.

Chronic Respiratory Diseases

Chronic respiratory diseases are diseases in the airways and other structures of the lung. The most common are chronic obstructive pulmonary disease (COPD), pneumoconiosis, and asthma. Tobacco use is the leading risk factor underlying chronic respiratory diseases, although air pollution, occupational chemicals and dusts, and lower respiratory infections during childhood all increase the risk of developing chronic respiratory diseases (WHO, 2016c). Chronic respiratory diseases are largely incurable, but can be managed through treatments that improve shortness of breath and dilate air passages.

Deaths from chronic respiratory diseases increased by 2.3% between 2005 and 2015 (**TABLE 8-6**). The relatively small increase in mortality from chronic respiratory diseases is largely a result of the effective tobacco control programs that have been implemented in recent decades.

Diabetes, Urogenital, and Endocrine Diseases

Deaths associated with diabetes, urogenital, blood, and endocrine diseases increased 29.4% between 2005 and 2015 (**TABLE 8-7**). The majority of these deaths are attributable to type 1 and 2 diabetes mellitus (**EXHIBIT 8-2** explains the difference between the types). Persons with type 1 diabetes are entirely dependent on insulin injections to survive, but persons with type 2 diabetes can also take oral medication to help the body use its existing insulin. Type 2 diabetes is both preventable and treatable with behavioral modifications, including changes to diet, physical activity, medications, and regular blood glucose screenings. The Diabetes Prevention Program is one approach to addressing diabetes (**EXHIBIT 8-3**).

Neurologic Disorders

Neurologic disorders are diseases of the central and peripheral nervous systems, which include the

TABLE 8-5 Changes in Global Deaths from Selected Cardiovascular Diseases, 2005–2015

Cardiovascular Disease	All-Age Deaths, 2005 (thousands)	All-Age Deaths, 2015 (thousands)	Percentage Change, 2005–2015 (%)
Overall	15,933.7	17,921.0	12.5
Rheumatic heart disease	333.2	319.4	–4.1
Ischemic heart disease	7,648.4	8,917.0	16.6
Cerebrovascular disease	6,020.9	6,326.1	5.1
Hypertensive heart disease	760.5	962.4	26.5

Data from Global Burden of Disease (GBD) Collaborators. (2016). Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: A systematic analysis for the Global Burden of Disease Study 2015. *The Lancet, 388* (10053), 1459–1544.

TABLE 8-6 Changes in Global Deaths from Selected Chronic Respiratory Diseases, 2005–2015

Chronic Respiratory Disease	All-Age Deaths, 2005 (thousands)	All-Age Deaths, 2015 (thousands)	Percentage Change, 2005–2015 (%)
Overall	3,709.1	3,795.5	2.3
Chronic obstructive pulmonary disease	3,100.5	3,188.3	2.8
Pneumoconiosis	31.9	36.1	13.2
Asthma	449.9	397.1	−11.7

Data from Global Burden of Disease (GBD) Collaborators. (2016). Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: A systematic analysis for the Global Burden of Disease Study 2015. *The Lancet, 388* (10053), 1459–1544.

TABLE 8-7 Changes in Global Deaths from Diabetes, Urogenital, Blood, and Endocrine Diseases, 2005–2015

Diabetes, Urogenital, Blood, and Endocrine Diseases	All-Age Deaths, 2005 (thousands)	All-Age Deaths, 2015 (thousands)	Percentage Change, 2005–2015 (%)
Overall	2,635.3	3,409.3	29.4
Diabetes mellitus	1,150.2	1,519.0	32.1
Chronic kidney disease	937.7	1,234.9	31.7

Data from Global Burden of Disease (GBD) Collaborators. (2016). Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: A systematic analysis for the Global Burden of Disease Study 2015. *The Lancet, 388* (10053), 1459–1544.

EXHIBIT 8-2 Diabetes: What's the Difference?

- **Diabetes mellitus (diabetes):** Disease caused by an increased concentration of glucose in the blood, due to dysregulation of insulin, the hormone that removes glucose from the bloodstream. This condition arises either from the pancreas not producing enough insulin (type 1 diabetes) or from the body not effectively being able to use the insulin it produces (type 2 diabetes). Type 2 diabetes is far more common (95%), and is caused by hormonal changes arising from excess body weight, excess intake of sugars and carbohydrates, and physical inactivity.
- **Urogenital diseases:** Diseases affecting the urinary tracts, including the kidneys, ureters, bladder, or urethra, or the reproductive organs (Nature, 2016).
- **Endocrine diseases:** Diseases affecting hormonal glands such as the thyroid, ovaries, testes, pancreas, and pituitary gland.

Data from World Health Organization (WHO). (2016d). Retrieved from: http://www.who.int/topics/diabetes_mellitus/en.

brain, spinal cord, and cranial and peripheral nerves. Deaths from neurologic disorders increased by 35.2% between 2005 and 2015, due largely to an increase in age-related conditions such as Alzheimer's disease and Parkinson's disease as global life expectancy and median age have increased (**TABLE 8-8**).

Alzheimer's disease, the most common form of dementia, is characterized by memory loss and deterioration of cognitive abilities that interfere with daily activities. Symptoms of Parkinson's disease include tremors, slowed movement, and rigid muscles. Both diseases are incurable, but treatments exist to alleviate their symptoms to some extent. It is estimated that the number of people affected by dementia will double every 20 years (WHO, 2006a). Both Alzheimer's and Parkinson's diseases,

EXHIBIT 8-3 Diabetes Prevention Program

The Diabetes Prevention Program (DPP) was an evidence-based program to demonstrate that lifestyle changes (modest weight loss through dietary changes and increases in physical activity) or pharmacologic therapy (through the oral drug metformin) can prevent or delay the onset of type 2 diabetes. The program was administered to 3,234 participants at 27 centers across the United States. Participants, who were 45% racial and ethnic minorities, were initially classified as having prediabetes, meaning they had abnormally high blood glucose levels but had not yet developed diabetes. The study found that the lifestyle intervention resulted in a 58% reduction in the risk of developing diabetes (U.S. Department of Health and Human Services [DHHS], National Institutes of Health, & National Institute of Diabetes and Digestive and Kidney Diseases, 2008). The pharmacologic therapy group taking metformin reduced their risk by 31%. With the effectiveness of the DPP, organizations such as Omada Health (2016) have emerged to translate the program to an online platform. Following rigorous testing, the U.S. Centers for Medicare and Medicaid Services announced that Omada Health's program would be reimbursed for at-risk seniors in 2016.

Data from US Department of Health and Human Services, National Institutes of Health, and National Institute of Diabetes and Digestive and Kidney Diseases. (2008). Diabetes prevention program (DPP). National Institutes of Health. Retrieved from: https://www.niddk.nih.gov/about-niddk/research-areas/diabetes/diabetes-prevention-program-dpp/Documents/DPP_508.pdf and Omada Health. (2016). Medicare will cover diabetes prevention program for at-risk seniors. Omada Health. Retrieved from: https://www.omadahealth.com/news/medicare-will-cover-diabetes-prevention-program-for-at-risk-seniors.

TABLE 8-8 Changes in Global Deaths from Selected Neurologic Disorders, 2005–2015

Neurologic Disorders	All-Age Deaths, 2005 (thousands)	All-Age Deaths, 2015 (thousands)	Percentage Change, 2005–2015 (%)
Overall	1,671.0	2,258.9	35.2
Alzheimer's disease and other dementias	1,380.8	1,908.2	38.2
Parkinson's disease	82.4	117.4	42.4
Epilepsy	119.0	124.9	5.0

Global Burden of Disease (GBD) Collaborators. (2016). Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: A systematic analysis for the Global Burden of Disease Study 2015. *The Lancet, 388* (10053), 1459–1544.

like other neurologic disorders, are associated with social stigma in many countries, which may cause persons suffering from these conditions to delay evaluation and treatment.

Mental and Substance Use Disorders

WHO (2014) defines mental health as "a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community." Although the slogan "no health without mental health" aims to integrate physical and mental health, on a practical level the two often occupy separate worlds of treatment and prevention (Horton, 2016). Between 2005 and 2015, all-age deaths from mental and substance use disorders increased by 6.2% (**TABLE 8-9**) (GBD Collaborators, 2015).

The global productivity loss attributable to poor mental health is approximately $1 trillion each year, or 10 billion days of lost work (Mnookin, 2016). This global cost of mental disorders is predicted to reach $6 trillion by 2030, an increase of 240% from 2010. With that said, mental and substance disorders are treatable with cost-effective interventions such as cognitive-behavioral therapy and oral medication (see the *Global Mental Health* chapter for more details on mental health). Access to mental health care can increase participation in the workforce, improve functioning at work, and reduce rates of absenteeism.

As with neurologic disorders, the stigma associated with poor mental health often inhibits effective treatment. This stigma can contribute to social

TABLE 8-9 Changes in Global Deaths from Selected Mental and Substance Use Disorders, 2005–2015

Mental and Substance Use Disorders	All-Age Deaths, 2005 (thousands)	All-Age Deaths, 2015 (thousands)	Percentage Change, 2005–2015 (%)
Overall	305.9	324.9	6.2
Alcohol use disorders	157.4	137.5	−12.6

Data from Global Burden of Disease (GBD) Collaborators. (2016). Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: A systematic analysis for the Global Burden of Disease Study 2015. *The Lancet, 388* (10053), 1459–1544.

TABLE 8-10 Changes in Global Deaths from Drug Use Disorders, 2005–2015

Drug Use Disorders	All-Age Deaths, 2005 (thousands)	All-Age Deaths, 2015 (thousands)	Percentage Change, 2005–2015 (%)
Overall	128.8	169.9	31.8
Opioid use disorders	94.2	122.1	29.6
Cocaine use disorders	7.4	11.1	49.7
Amphetamine use disorders	7.3	12.2	67.5

Data from Global Burden of Disease (GBD) Collaborators. (2016). Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: A systematic analysis for the Global Burden of Disease Study 2015. *The Lancet, 388* (10053), 1459–1544.

isolation, low self-esteem, and fewer chances for succeeding in maintaining employment, undertaking education, and securing housing.

Substance Use Disorders

A substance in this context is "a psychoactive compound with the potential to cause health and social problems." The most severe manifestation of a substance or drug use disorder is addiction (DHHS, 2016). Deaths from drug use disorders rose by 31.8% between 2005 and 2015 (**TABLE 8-10**).

The rising global substance-related mortality is being driven by opioid, cocaine, and amphetamine use disorders. In the United States, recent studies suggest increases in substance-related mortality among middle-aged white men, but not in other ethnic groups such as blacks and Latinos (Case & Deaton, 2015). In 2016, the Office of the U.S. Surgeon General released its first report on addiction and substance abuse, which outlined several solutions with global applicability. These include new policies and programs, investment in expanding the scientific evidence base, and a cultural shift in how addiction is viewed and treated, as the stigma of substance dependence often impairs access to treatment.

Musculoskeletal Disorders

Musculoskeletal disorders relate to the body's movement system, including the joints, ligaments, muscles, nerves, and tendons. They are the most common cause of severe long-term pain and physical disability worldwide. Deaths from musculoskeletal disorders increased by 18.2% between 2005 and 2015, largely a result of aging global populations (**TABLE 8-11**). New technologies—particularly those focused on artificial intelligence and robotics—are emerging that have the potential to enable people to maintain their movement in older age.

Country-Level Analysis

With the burden of chronic diseases becoming more prevalent in LMICs through the epidemiologic transition, various countries are attempting to tackle the prevention and management of chronic diseases. **TABLE 8-12** identifies the levels of major chronic

TABLE 8-11 Changes in Global Deaths from Musculoskeletal Disorders, 2005–2015

Musculoskeletal Disorders	All-Age Deaths, 2005 (thousands)	All-Age Deaths, 2015 (thousands)	Percentage Change, 2005–2015 (%)
Overall	76.2	90.1	18.2
Rheumatoid arthritis	26.5	30.0	13.2

Data from Global Burden of Disease (GBD) Collaborators. (2016). Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: A systematic analysis for the Global Burden of Disease Study 2015. *The Lancet, 388* (10053), 1459–1544.

TABLE 8-12 Country-Level Data on Chronic Diseases and Risk Factors for Selected Countries

Chronic Disease Indicator	High Income: United States	Upper Middle Income: China	Middle Income: India	Lower Middle Income: Nigeria	Low Income: Rwanda
Risk Factors (DALYs per 100,000)					
Tobacco	3,324.50	3,166.13	2,080.53	355.4	627.69
High body mass index (BMI)	3,295.25	1,576.46	1,261.52	510.75	492.64
Dietary risks	3,143.06	4,022.99	3,159.35	686.33	816.49
Alcohol and drug use	2,787.24	1,944.27	1,259.82	1,372.99	1,874.15
Low physical activity	425.12	334.74	336.10	71.5	62.45
Chronic Diseases (DALYs per 100,000)					
Cardiovascular diseases	4,591.46	5,713.55	4,987.41	1,382.93	1,904.42
Neoplasms	4,231.83	4,285.42	1,772.68	1,300.64	1,707.27
Chronic respiratory	1,449.04	1,303.01	2,251.40	475.59	750.63
Diabetes	2,227.00	1,485.19	1,987.82	1,516.62	1,097.35
Mental and substance use	3,724.87	2,200.73	1,983.87	1,705.66	1,839.89

Data from Global Burden of Disease (GBD) Collaborators. (2016). Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: A systematic analysis for the Global Burden of Disease Study 2015. *The Lancet, 388* (10053), 1459–1544.

diseases and their associated risk factors for a selection of upper-, middle-, and low-income countries.

Despite the growing prevalence of chronic diseases in many LMICs, governments have been slow to introduce effective interventions. For example, 80% of the world's tobacco smokers reside in LMICs, yet few of the governments in these countries have introduced excise taxes on tobacco. If a 33% price increase on tobacco cigarettes were implemented globally, 22 million to 65 million smoking-related deaths would be averted over the next 50 years—almost 90% of those deaths would occur in LMICs (Gaziano & Pagidipati, 2013). **TABLE 8-13** highlights the most cost-effective interventions for chronic diseases in

TABLE 8-13 Cost-Effective Interventions for Chronic Diseases in Resource-Constrained Environments

Risk Factor/Disease	Interventions
Tobacco use	▪ Tax Increases ▪ Smoke-free indoor workplaces and public places ▪ Health information and warnings ▪ Bans on tobacco advertising, promotion, and sponsorship
Harmful alcohol use	▪ Tax increases ▪ Restricted access to retailed alcohol ▪ Bans on alcohol advertising ▪ Reduced salt intake in food
Unhealthy diet and physical inactivity	▪ Replacement of trans fat with polyunsaturated fat ▪ Public awareness through mass media on diet and physical Inactivity
Cardiovascular disease (CVD) and diabetes	▪ Counseling and multidrug therapy for people with a high risk of developing heart attacks and strokes (including those with established CVD) ▪ Treatment of heart attacks with aspirin
Cancer	▪ Hepatitis B immunization to prevent liver cancer (already scaled up) ▪ Screening and treatment of precancerous lesions to prevent cervical cancer

Note: NCD = noncommunicable disease.
Reprinted from From Burden to "Best Buys": Reducing the Economic Impact of Non-Communicable Diseases in Low- and Middle-Income Countries, World Health Organization, Copyright 2011.

resource-constrained environments. Country examples of effective chronic disease control strategies are detailed later in this chapter.

Clinical Features of Common Chronic Diseases

After a chronic disease has developed, it can often be treated, controlled, or even cured with early detection, a process known as *secondary prevention*. Although some chronic conditions can be diagnosed only with laboratory tests and other investigations, many individuals display signs and symptoms that can be detected with minimal medical training. This allows physicians and community health workers alike to refer high-risk persons for further specialized testing. **TABLE 8-14** summarizes common clinical signs of key chronic conditions.

Comorbid Conditions

Comorbidity refers to the simultaneous occurrence of two or more disorders in one person. A common chronic disease comorbidity is diabetes and cardiovascular disease. Heart attacks, for example, are significantly more common in people with diabetes, as are deaths following a first heart attack (International Diabetes Federation, 2003). Similarly, high cholesterol and hypertension are both causative of and concomitant with coronary heart disease and cerebrovascular disease, and both are growing more common with urban development (see **EXHIBIT 8-4**). In addition, persons with chronic conditions have a greater risk of developing mental disorders such as depression (WHO, 2003a). The proportion of patients with depression who also have other common chronic diseases, such as cardiovascular disease, diabetes, and cancer, ranges from 22% to 33% (WHO, 2003a).

There are also interactive effects between certain infectious and noninfectious diseases. Several infectious agents cause cancer: Hepatitis B virus causes liver cancer; human papillomavirus (HPV) causes cervical cancer; *Helicobacter pylori* causes stomach cancer; HIV causes several cancers, including Kaposi's sarcoma and non-Hodgkin's lymphoma; and *Schistosoma haematobium* causes bladder cancer (Stewart & Kleihaus, 2003). All of these cancers are common in LMICs, especially where resources for treatment are inadequate. Vaccines to prevent these infections and effective drugs to treat them could greatly reduce the cancer burden in these countries.

TABLE 8-14 Clinical Features of Common Chronic Conditions

Conditions	Typical Clinical Features	Diagnostic Requirements
Hypertension	No obvious symptoms	Measure blood pressure using standardized procedures
Hyperlipidemia	No obvious symptoms	Measure total cholesterol, high-density lipoprotein cholesterol, and triglyceride levels in fasting blood samples
Obesity	Fatigue, daytime somnolence, excessive snoring, and osteoarthritis	Measure height (meters) and weight (kilograms); calculate body mass index (BMI) = weight/height^2; measure waist circumference
Diabetes	Malaise, excessive thirst, excessive urination, hunger, blurred vision, and tendency to develop infections	Measure fasting or random blood glucose, perform glucose tolerance test, or check blood hemoglobin A1c (HbA1c) level
Asthma	Wheezing, difficulty with breathing, and coughing (bronchospasm) relieved by asthma medication	Peak flow measurements and other lung function tests, chest x-ray, and relief of symptoms with bronchodilators
Chronic bronchitis	Productive cough for 3 months per year in 2 consecutive years, shortness of breath, and frequent chest infections	Lung function tests, chest x-ray
Myocardial infarction (heart attack)	Sudden onset of severe crushing chest pain that could radiate down left arm, to the neck or jaw, with associated sweating, faintness, shortness of breath, and nausea	Clinical examination, electrocardiograph, blood tests for cardiac enzymes
Cerebrovascular disease (stroke)	Sudden weakness; loss of motor or sensory function, usually unilateral; inability to speak; vision disturbances; or unconsciousness	Neurologic and full clinical examination, head computed tomography (CT) scan if available, identify underlying causes
Angina	Central chest pain precipitated by exertion and relieved by resting	Electrocardiograph, pain relieved by angina medication
Transient ischemic attack	Same presentation as stroke—weakness, loss of motor or sensory function, inability to speak, or vision disturbance—but resolving within 24 hours	Neurologic and full clinical examination, head CT scan if available, identify underlying causes
Neoplasms and cancers	Unexplained loss of weight, malaise, and tiredness	Full clinical examination; biopsy, imaging, and/or special blood tests as appropriate

Finally, there are interactions between chronic disease risk factors and nonchronic infectious diseases. Tobacco increases the death rate from tuberculosis (TB)—a common disease of poverty—in those persons already infected with the TB bacterium. In India, smokers are 4.5 times more likely to die of TB than are nonsmokers (Gajalakshmi, Peto, Kanaka, & Jha, 2003). An estimated 80% of TB-infected patients smoke. As a result, tobacco is probably the major cause of death in treated TB patients (Yach & Raviglione, 2004).

The current burden of chronic diseases reflects cumulative risks over people's lifetimes. The accumulation of chronic disease risk begins in fetal life, and

TABLE 8-13 Cost-Effective Interventions for Chronic Diseases in Resource-Constrained Environments

Risk Factor/Disease	Interventions
Tobacco use	■ Tax Increases ■ Smoke-free indoor workplaces and public places ■ Health information and warnings ■ Bans on tobacco advertising, promotion, and sponsorship
Harmful alcohol use	■ Tax increases ■ Restricted access to retailed alcohol ■ Bans on alcohol advertising ■ Reduced salt intake in food
Unhealthy diet and physical inactivity	■ Replacement of trans fat with polyunsaturated fat ■ Public awareness through mass media on diet and physical Inactivity
Cardiovascular disease (CVD) and diabetes	■ Counseling and multidrug therapy for people with a high risk of developing heart attacks and strokes (including those with established CVD) ■ Treatment of heart attacks with aspirin
Cancer	■ Hepatitis B immunization to prevent liver cancer (already scaled up) ■ Screening and treatment of precancerous lesions to prevent cervical cancer

Note: NCD = noncommunicable disease.

resource-constrained environments. Country examples of effective chronic disease control strategies are detailed later in this chapter.

Clinical Features of Common Chronic Diseases

After a chronic disease has developed, it can often be treated, controlled, or even cured with early detection, a process known as *secondary prevention*. Although some chronic conditions can be diagnosed only with laboratory tests and other investigations, many individuals display signs and symptoms that can be detected with minimal medical training. This allows physicians and community health workers alike to refer high-risk persons for further specialized testing. **TABLE 8-14** summarizes common clinical signs of key chronic conditions.

Comorbid Conditions

Comorbidity refers to the simultaneous occurrence of two or more disorders in one person. A common chronic disease comorbidity is diabetes and cardiovascular disease. Heart attacks, for example, are significantly more common in people with diabetes, as are deaths following a first heart attack (International Diabetes Federation, 2003). Similarly, high cholesterol and hypertension are both causative of and concomitant with coronary heart disease and cerebrovascular disease, and both are growing more common with urban development (see **EXHIBIT 8-4**). In addition, persons with chronic conditions have a greater risk of developing mental disorders such as depression (WHO, 2003a). The proportion of patients with depression who also have other common chronic diseases, such as cardiovascular disease, diabetes, and cancer, ranges from 22% to 33% (WHO, 2003a).

There are also interactive effects between certain infectious and noninfectious diseases. Several infectious agents cause cancer: Hepatitis B virus causes liver cancer; human papillomavirus (HPV) causes cervical cancer; *Helicobacter pylori* causes stomach cancer; HIV causes several cancers, including Kaposi's sarcoma and non-Hodgkin's lymphoma; and *Schistosoma haematobium* causes bladder cancer (Stewart & Kleihaus, 2003). All of these cancers are common in LMICs, especially where resources for treatment are inadequate. Vaccines to prevent these infections and effective drugs to treat them could greatly reduce the cancer burden in these countries.

TABLE 8-14 Clinical Features of Common Chronic Conditions

Conditions	Typical Clinical Features	Diagnostic Requirements
Hypertension	No obvious symptoms	Measure blood pressure using standardized procedures
Hyperlipidemia	No obvious symptoms	Measure total cholesterol, high-density lipoprotein cholesterol, and triglyceride levels in fasting blood samples
Obesity	Fatigue, daytime somnolence, excessive snoring, and osteoarthritis	Measure height (meters) and weight (kilograms); calculate body mass index (BMI) = weight/height^2; measure waist circumference
Diabetes	Malaise, excessive thirst, excessive urination, hunger, blurred vision, and tendency to develop infections	Measure fasting or random blood glucose, perform glucose tolerance test, or check blood hemoglobin A1c (HbA1c) level
Asthma	Wheezing, difficulty with breathing, and coughing (bronchospasm) relieved by asthma medication	Peak flow measurements and other lung function tests, chest x-ray, and relief of symptoms with bronchodilators
Chronic bronchitis	Productive cough for 3 months per year in 2 consecutive years, shortness of breath, and frequent chest infections	Lung function tests, chest x-ray
Myocardial infarction (heart attack)	Sudden onset of severe crushing chest pain that could radiate down left arm, to the neck or jaw, with associated sweating, faintness, shortness of breath, and nausea	Clinical examination, electrocardiograph, blood tests for cardiac enzymes
Cerebrovascular disease (stroke)	Sudden weakness; loss of motor or sensory function, usually unilateral; inability to speak; vision disturbances; or unconsciousness	Neurologic and full clinical examination, head computed tomography (CT) scan if available, identify underlying causes
Angina	Central chest pain precipitated by exertion and relieved by resting	Electrocardiograph, pain relieved by angina medication
Transient ischemic attack	Same presentation as stroke—weakness, loss of motor or sensory function, inability to speak, or vision disturbance—but resolving within 24 hours	Neurologic and full clinical examination, head CT scan if available, identify underlying causes
Neoplasms and cancers	Unexplained loss of weight, malaise, and tiredness	Full clinical examination; biopsy, imaging, and/or special blood tests as appropriate

Finally, there are interactions between chronic disease risk factors and nonchronic infectious diseases. Tobacco increases the death rate from tuberculosis (TB)—a common disease of poverty—in those persons already infected with the TB bacterium. In India, smokers are 4.5 times more likely to die of TB than are nonsmokers (Gajalakshmi, Peto, Kanaka, & Jha, 2003). An estimated 80% of TB-infected patients smoke. As a result, tobacco is probably the major cause of death in treated TB patients (Yach & Raviglione, 2004).

The current burden of chronic diseases reflects cumulative risks over people's lifetimes. The accumulation of chronic disease risk begins in fetal life, and

EXHIBIT 8-4 Hypercholesterolemia and Hypertension in Africa

After many decades of scientific debate, data from large community-based trials in the 1970s and 1980s proved that high total blood cholesterol levels are an independent major risk factor for atherosclerotic chronic diseases such as coronary heart disease and cerebrovascular disease (strokes). Total blood cholesterol levels vary considerably between populations with different dietary patterns. For example, people in Africa who follow traditional diets may have lower blood cholesterol levels than people in Europe or the United States, including those who migrated from LMICs and adopted typical Western lifestyles.

These differences are present from a young age. In Johannesburg and Soweto, South Africa, Steyn and colleagues (2000) found that the mean total cholesterol level in ethnically African and multiracial 5-year-old children was 3.9 mmol/L, compared with 4.1 mmol/L for Indian children and 4.4 mmol/L for white children. Several studies in Africa have shown that total cholesterol levels usually differ between urban and rural settings independent of ethnicity, reflecting the effects of urbanization on increasing total cholesterol levels (Knuiman, Hermus, & Hautvast, 1980; Seftel et al., 1993; Swai et al., 1993).

It is estimated that between 10 million and 20 million people in sub-Saharan Africa alone have hypertension and, further, that adequate hypertension treatment could prevent approximately 250,000 deaths in this region (Cappuccio, Plange-Rhule, Phillips, & Eastwood, 2000). Unfortunately, hypertension is universally underdiagnosed and inadequately treated, such that extensive end-organ damage and premature death are often seen. Furthermore, hypertension frequently coexists with other chronic diseases such as diabetes.

Early surveys in sub-Saharan African countries showed that the lowest prevalence of hypertension occurred in the lowest-income countries; as affluence increased, however, prevalence increased. Researchers also found that hypertension is more common in urban than rural settings (Nissinen, Bothig, Granroth, & Lopez, 1988). The Kenyan Luo migration study conducted by Poulter and colleagues (1990) showed that people migrating from traditional rural villages on the northern shores of Lake Victoria to the urban settings of Nairobi had higher body weights, blood pressure, pulse rates, and urinary sodium–potassium ratios than those who remained in the rural areas. This result suggests a marked change in the diet of the new arrivals in Nairobi, including higher salt and calorie intakes, along with a reduced potassium intake due to consumption of fewer fruits and vegetables.

marches forward starting early in infancy and childhood (**FIGURE 8-3**). Thus, emerging evidence supports starting health promotion efforts during pregnancy and early childhood and continuing prevention efforts throughout the life course (Institute of Medicine, 2010).

Early-life and prenatal risk factors—such as suboptimal diet, early termination of breastfeeding, exposure to tobacco and alcohol, exposure to indoor air pollution from biomass fuels, and repeated respiratory infections—are important for the development of chronic diseases in adulthood. Recent research from birth cohort studies has documented how and when these life course influences happen (Aboderin et al., 2001; Batty & Leon, 2002). Some life-course influences are disease-specific, whereas others are cohort-specific, but nearly all depend on a few risk factors. For example, 80% to 90% of patients who develop clinically significant congenital heart disease and more than 95% of patients who have experienced a fatal congenital heart disease event have at least one of the major cardiac risk factors—smoking, diabetes, hypertension, or hypercholesterolemia (Canto & Iskandrian, 2003). Studies also indicate that early postnatal nutrition permanently affects the major components of the metabolic syndrome that determine the individual's propensity to cardiovascular disease (Singhal & Lucas, 2004) and that influences in fetal life and early childhood are related to systolic blood pressure (Levitt et al., 1999).

Chronic obstructive pulmonary disease and lung dysfunction in adults are also the result of cumulative exposures that start early in life. South African studies have shown that what were assumed to be genetic differences in lung size are probably due to early childhood respiratory infections occurring in crowded homes where biomass fuel is used, combined with tobacco use and adverse occupational exposures (Goldin, Louw, & Joubert, 1996). A recent population survey of chronic bronchitis in 5,671 men and 8,155 women in South Africa estimated that 25% of these cases were due to tobacco use, 14% to occupational exposure, and 10% to past TB. In women, these fractions were 14% for use of smoky domestic fuel, 10% for past TB, and 11% for tobacco use (Ehrlich et al., 2004). This study demonstrates how multiple assaults on the lung—including infectious agents, fuel use, exposure at work, and tobacco use—are important in chronic lung disease. All of these factors have been shown to be related to poverty as well.

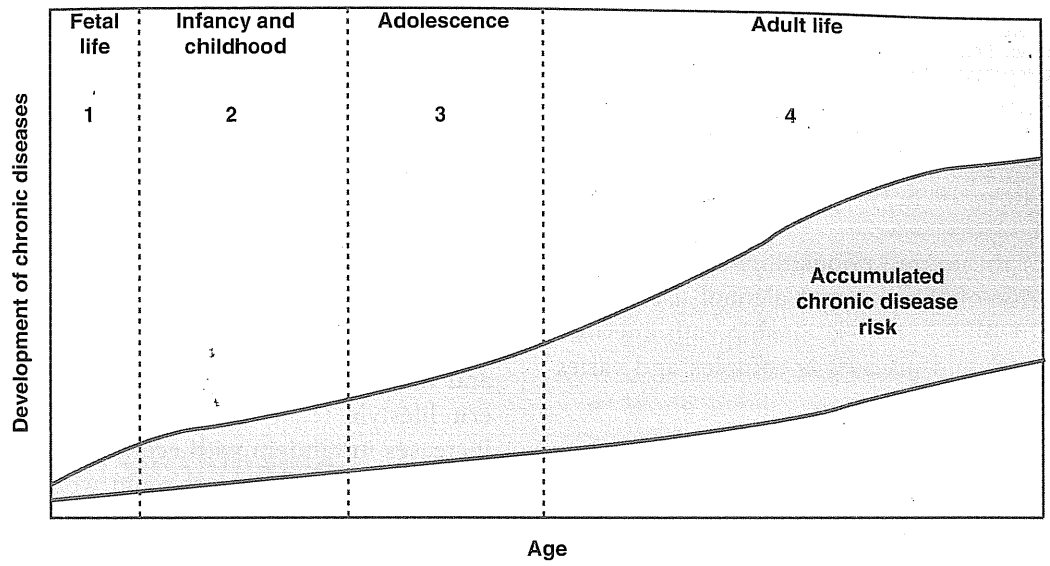


FIGURE 8-3 A life course approach to chronic disease prevention.

Reprinted from Aboderin, I., Kalache, A., Ben-Shlomo, Y., Lynch, J. W., Yajnik, C. D., Kuh, D., & Yach, D. (2001). *Life course perspectives in coronary heart disease, stroke and diabetes: Key issues and implications for policy and research*. Geneva, Switzerland: World Health Organization. Retrieved from http://apps.who.int/iris/bitstream/10665/67173/1/WHO_NMH_NPH_01.4.pdf

Global Costs and Consequences of Chronic Diseases

Although chronic diseases will exact a grave financial toll if not addressed by global stakeholders, their potential impact on other aspects of human well-being, such as environmental welfare and socioeconomic inequity, is also severe. This section explores the global costs and consequences of chronic diseases.

Direct Economic Costs

By 2030, it is estimated that the cost of chronic diseases will amount to $30 trillion worldwide (Bloom et al., 2011). In the United States, for example, chronic diseases are the primary healthcare cost drivers, with diabetes ($101 billion), heart disease ($88 billion), and low back and neck pain ($86 billion) being the top three in terms of healthcare expenditures (Dieleman et al., 2016). Chronic diseases not only threaten the fiscal integrity of health budgets and shorten productive work careers, but also undermine the long-term sustainability of systems that deliver universal health coverage (Greenberg, Leeder, & Raymond, 2016). Unfortunately, chronic diseases remain greatly underfunded in LMICs (Clinton & Sridhar, 2017). None of the major health development funders, such as the Bill and Melinda Gates Foundation, WHO, World Bank, Global Fund to Fight HIV/AIDS, TB and Malaria, and Global Alliance of Vaccine Initiatives, is dedicated exclusively to chronic diseases.

Further Macroeconomic Impacts

Indirect productivity losses due to chronic diseases will affect the global economy because premature death and disability will dampen the engine of productivity and reduce economic growth in LMICs (Leeder, Raymond, Greenberg, Liu, & Esson, 2004). Some economists argue the potential returns for high-income-country investors from LMICs could be higher than from high-income countries over the long term (Clark & Hebb, 2002; Heller, 2003; Kimmis, Gottchalk, Armendariz, & Griffith-Jones, 2002). If chronic diseases do diminish productivity as predicted, the effects will, therefore, impact both wealthy countries and lower income countries alike. Both multinational corporations and pension funds face risks from this source, as demonstrated by the HIV/AIDS pandemic, which showed that chronic conditions can place heavy financial burdens on a company when treatment is expensive.

Impact on Health Inequalities

In 1952, Gunnar Myrdal asserted that people are sick because they are poor, and they become poorer because they are sick. This downward spiral certainly occurs with chronic diseases. Increased cumulative exposure to risk factors over the life course, combined with social and economic inequalities, leads to inequalities seen in later adult life.

Chronic diseases impose a significant burden on low-income populations. In high-income countries, the relationships among poverty and cardiovascular disease, cancer, diabetes, and their associated risk

factors are well described, and chronic diseases drive health inequalities by social class, ethnicity, and gender (Aboderin et al., 2001; Bátty & Leon, 2002; Brands & Yach, 2001; Kogevinas, Pearce, Susser, & Boffetta, 1997; Mackenbach et al., 2000; Marmot, Adelstein, Robinson, & Rose, 1978; Wong, Shapiro, Boscardin, & Ettner, 2002).

In LMICs, the poorest populations already exhibit the highest risk of tobacco and alcohol use (Jha & Chaloupka, 2000), but the relationship with intermediate risk factors and diseases is complex and varies between countries:

- India: Currently, rates of hypertension, cholesterol, diabetes, and cardiovascular disease increase directly with socioeconomic status (Singh et al., 1999; Vikram et al., 2003). Yet, high rates of hypertension and elevated cholesterol levels are now being measured in urban slums (Misra et al., 2001), and tobacco consumption is higher among the most poorly educated. Death rates from TB—a disease associated with poverty— are four times higher among people who smoke relative to nonsmokers (Gajalakshmi et al., 2003). Poorer people also suffer from relatively higher rates of complications from diabetes, owing to their frequent exposure to multiple risk factors (Ramachandran, Snehalatha, Vijay, & King, 2002).
- Brazil: In urban Brazil, research in the 1980s demonstrated an inverse relationship between socioeconomic status and smoking and alcohol consumption in men and women (Duncan et al., 1993). Researchers also found inverse links between socioeconomic status and hypertension in men, and between sedentary lifestyle and obesity in women.
- Jamaica: Obesity increases with income level strongly in men and weakly in women (owing to high levels of obesity among the poorest women) (Mendez et al., 2004). The relationships among income, diabetes, and hypertension, however, are nonlinear. In women, plotting diabetes and hypertension prevalence against income forms a U-shaped curve, with the highest rates of diabetes found in the poorest women. Obesity and diabetes are strongly related, especially among poor women. The lack of a strong income gradient in hypertension or diabetes—despite a strong relationship between income and obesity—might be partly attributable to greater adverse effects of obesity among the poor.
- China: A U-shaped relationship exists between socioeconomic status and hypertension in women. This result in part reflects the fact that poorer women tend to have lower body mass indices and to smoke less but engage in less physical activity; the reverse is true for the wealthiest group (Bell, Adair, & Popkin, 2004).

Owing to long and often variable lag times between exposure to risk factors and disease onset, the relationships among poverty, exposure to chronic disease risks, and development of disease remain unclear in LMICs. Over time, accumulation of risk among low-income groups will likely increase as availability and marketing of products associated with a Western lifestyle (e.g., higher-fat, higher-calorie foods) increases in tandem with economic development. In the long term, this trend could worsen associations between chronic diseases and poverty.

Obesity data provide an example. Until the late 1980s, socioeconomic status and obesity tended to be inversely related in high-income populations and directly related in low- and middle-income populations (Sobal & Stunkard, 1989). In other words, in LMICs, obesity was associated with more affluent groups. More recently, however, work from Brazil has shown that over time female obesity shifts toward lower-income groups in economically more developed regions and urban areas (Monteiro, Conde, Lu, & Popkin, 2004). Although low socioeconomic status still confers protection from obesity in low-income nations, once the gross national product (GNP) reaches a value of approximately $2,500 per capita, obesity rates correlate directly with low socioeconomic status (Monteiro et al., 2004; Peña & Bacallao, 2000).

A recent study in the United States and China illustrates this point (Kim, Symons, & Popkin, 2004). Using a composite lifestyle index (LI) that included data on diet, smoking, alcohol, and physical activity, the authors found an inverse relationship exists between socioeconomic status and the LI in the United States, whereas a direct relationship exists in China. This result suggests that policy makers in LMICs should not wait for a social class gradient to appear in the occurrence of chronic disease (or risk factors) before implementing disease-preventive and health-promoting policies.

A growing challenge is the rise of health inequalities among the elderly. With the global population age 60 years and older forecast to more than triple in the next 45 years, the size of this gap will increase substantially (WHO, 2008a). In LMICs, where the proportion of older people is growing fastest, the lack of pension schemes and deteriorating traditional social security arrangements act together to worsen the burden of health inequalities (Commission on Social

Determinants of Health, 2008). Although health inequalities in the elderly tend to be smaller than in younger populations, they remain an important and poorly understood public health challenge (von dem Knesebeck, 2010). Older women, especially widows, are particularly affected because they tend to be poorer and more susceptible to chronic diseases (Women and Gender Equity Knowledge Network [WGEKN], 2007). The *Health and 'The Economy'* chapter provides more information on the relationship between health and the economy.

Impact on Sustainable Development and the Environment

Sustainable development, which in recent decades has linked economic and political development with environmental stewardship, has long impacted chronic disease control strategies and priorities, including the United Nations' recent Sustainable Development Goals. Global research and policy agreements now agree that chronic disease proliferation and environmental threats are inextricably linked.

Sustainable Development and Planetary Health

In 1987, the Bruntland Commission proposed what is now the commonly accepted definition of sustainable development: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987). Realizing the linkages between human health and the environment, the Commission aimed to place environmental issues on the agenda of the United Nations. It provided the foundation for the 1992 Earth Summit in Brazil, which culminated in Agenda 21 and the Rio Declaration on Environment and Development, and later for the Commission on Sustainable Development (**EXHIBIT 8-5**).

The outputs from UNCED established that human health was both an input and an output of sustainable development. In other words, sustainable development cannot be achieved if there is a high prevalence of chronic disease, whereas human health cannot be maintained without healthy environments (von Schirnding, 2002). Conversely, if left unchecked, drivers of chronic disease can and will impact sustainable environmental growth—for example, through global demand for energy-dense foodstuffs, such as refined grains and red meats, that consume more production resources than vegetables; or use of fossil fuels to power automobiles in lieu of more physically energetic transport choices such as walking or biking.

Chronic diseases have multiple causes and effects, at the level of both individuals and society. Studies of chronic diseases' impact—and the best ways to control it—have debunked several prior assumptions commonly held in global health and development circles (**EXHIBIT 8-6**).

EXHIBIT 8-5 The United Nations' Summits on Sustainable Development

- **United Nations Conference on Environment and Development** (UNCED: 1992, Rio de Janeiro, Brazil): The primary output was Agenda 21, a nonbinding, voluntary action plan voted on by 178 governments to achieve sustainable development. The UN General Assembly established the Rio Declaration on Environment and Development to coordinate follow-up from the conference.
- **World Summit on Sustainable Development** (2002, Johannesburg, South Africa): The World Summit evaluated progress from the UNCED. The Johannesburg Declaration was the result of the summit, which espoused multilateralism to achieve the objectives of sustainable development.
- **United Nations Conference on Sustainable Development** (2012, Rio de Janeiro, Brazil): The output was an outcome document to facilitate action promoting a sustainable future for the planet for present and future generations. This conference began to establish the Sustainable Development Goals, to build on the Millennium Development Goals.

Stakeholder Responses to the Growing Burden of Chronic Disease

The causes of chronic diseases are many and complex, and arise at both individual and population levels. Nevertheless, control of chronic disease is possible, though it requires creative thinking, avoidance of myths and false assumptions, and engagement of multiple stakeholders. A variety of stakeholders have begun to tackle this burden worldwide. This section explores their responses to the growing burden of chronic diseases.

EXHIBIT 8-6 Eight Myths of Chronic Disease Burden and Control

Myth 1: We can wait until infectious diseases are controlled.
Reality: As development progresses, chronic diseases do not smoothly displace acute diseases. Many countries have a double burden of disease; thus we must deal with both and develop the health system accordingly. Further, some infectious diseases are chronic in nature (e.g., HIV/AIDS).
Myth 2: Economic growth will improve all health conditions.
Reality: Economic development can improve health in LMICs, yet economic growth can also exacerbate chronic diseases.
Myth 3: Chronic diseases are diseases of affluence.
Reality: Chronic diseases are not solely diseases of affluence in high-income countries and in most LMICs. Low socioeconomic status leads to cumulative exposure to risk factors, greater comorbidity, and decreased access to quality health care.
Myth 4: Chronic diseases are diseases of the elderly.
Reality: Chronic diseases in LMICs are no longer just diseases of the elderly. Instead, chronic diseases in these countries affect a much higher proportion of people during their prime working years, compared to high-income countries.
Myth 5: Chronic diseases result from freely adopted risks.
Reality: Chronic diseases cannot be blamed solely on the failure of individual responsibility, because the cultural and environmental contexts in any society or community inevitably affect personal choices. Thus governments, industry, and others play a role in their incidence.
Myth 6: Benefits of chronic disease control accrue only to individuals.
Reality: Chronic disease control fosters positive social development and benefits societies economically, thereby benefiting the public as a whole. Like acute disease control, chronic disease control is an appropriate public investment.
Myth 7: Acute, infectious disease models are applicable to chronic diseases.
Reality: Interventions for acute diseases are relatively simple, whereas chronic diseases require a planned, proactive approach to health care, and the active participation of patients, families, and communities.
Myth 8: Treating individuals in the health sector is the only appropriate chronic disease strategy.
Reality: The medical community has focused on using traditional approaches to screen "high-risk" individuals—that is, those persons with a high probability of contracting chronic diseases. Yet, prevention requires a multisectoral commitment in addition to more comprehensive health service interventions for clinical prevention.

EXHIBIT 8-7 Government Levers to Influence Public Health

- **Taxes:** A tax is a financial charge imposed by a government to fund public expenditures. Governments often introduce taxes on products harmful to human health, such as tobacco and alcohol products, and more recently sweetened beverages. Differential taxes—that is, taxes proportionate to the health risk of a product—are particularly effective in deterring unhealthy behaviors and generating additional income for government (Pomeranz, 2016).
- **Access restrictions:** Governments frequently introduce restrictions on the availability of harmful products. For example, minimum age restrictions on the purchase of tobacco and alcohol products limit their use by children and adolescents. Restrictions on purchasing times and locations are also common.
- **Educational campaigns:** Educational campaigns inform a population on a specific health issue, such as physical activity or diet. This approach may also include compulsory labeling on nutrition content in foods.

Government

In many high-income countries, maintaining and improving public health is a government responsibility. Governments can introduce a variety of interventions to influence and motivate the public's health behaviors (**EXHIBIT 8-7**). These are sometimes predicated on paternalistic measures that entail modifying health behaviors at the population level.

One notable example is Finland's North Karelia Project, which represented a response to the high cardiovascular mortality in the country, and which used education, community outreach, and policy and care delivery changes to fight cardiovascular disease in this northern Finnish province. This pilot project began in 1972. Between 1969 and 2005, age-adjusted coronary heart disease mortality rate among the 35- to 64-year-old male population declined in North Karelia by 85% and in all of Finland by 80% (**FIGURE 8-4**, **EXHIBIT 8-8**) (Puska, 2016). The project formally ended after 25 years, though national prevention activities continue.

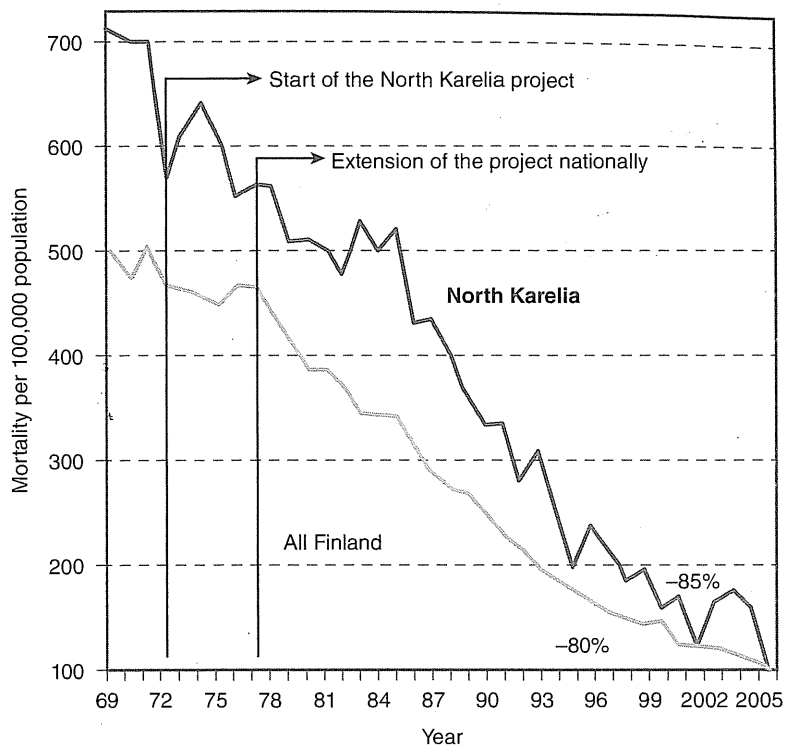


FIGURE 8-4 Age-adjusted mortality rates of coronary heart disease in North Karelia, 1969–2005.

Reproduced from Puska P, Vartiainen E, Laatikainen T, Jousilahti P & Paavola M. (2009). *The North Karelia Project: From North Korelia to natianal action.* National Institute for Health and Welfare & North Karelia Project Foundation. Retrieved from: https://www.julkari.fi/bitstream/handle/10024/80109/731beafd-b544-42b2-b853-baa87db6a046.pdf?sequence=1.

EXHIBIT 8-8 Why Was the North Karelia Project Successful?

- **Appropriate theory base:** Correct and appropriate public health understanding of the problem that identified major causal risk factors in the population and effective interventions.
- **Flexible intervention:** Ability for interventions to be modified based on practical situations and natural occurrences in the community.
- **Intensive intervention:** Interventions with the potential to mobilize and reach a large number of people.
- **Working with the people:** Collaborative approach with the community that established ownership by the people.
- **Community organization:** Engagement with organizations in the community to contribute to practical objectives.
- **Work with health services:** Health services must be supportive and form a backbone to the local initiatives.
- **Official authority:** Linkage to official administrative structures and health authorities.
- **Limited targets/outcome orientation:** Targeted interventions that were oriented to health outcomes.
- **Positive messages:** Positive framing of health messages to overcome a challenging problem.
- **Bottom-up, top-down:** A blended model that integrated approaches from the top and the bottom.
- **Working with the media:** Partnerships with the media to disseminate information about key activities and results.

Data from Puska, P. (2016). Why did North Karelia-Finland work?: Is it transferrable? *Global Heart, 11*(4), 387–391.

Another country making strides in curbing chronic diseases is Mexico. Diabetes is the leading cause of death and disability in Mexico, and its prevalence increased by 60% between 2000 and 2012. During the same period, hypertension increased by approximately 30%. Despite the large burden of chronic diseases in the country, access to services and effective interventions remains low. The national health system has responded by establishing a chronic disease department within the Ministry of Health, and implementing strategies to improve physical activity, minimize unhealthy diets, and reduce the harmful effects of tobacco and alcohol use.

Mexico also introduced a soda tax of 1 peso per liter on sugar-sweetened beverages in January 2014. Purchases of the taxed beverages decreased by 5.5% in

2014, and by 9.7% in 2015. Households at the lowest socioeconomic level had the largest declines in purchases of taxed beverages. While the tax is a starting point, greater advocacy and interventions are needed to shift the growing burden of chronic diseases in Mexico.

A third country addressing chronic diseases is Ghana, which is testing a community-based approach to cardiovascular disease (CVD) management and control through an international public–private partnership. The project aims to use task-shifting and new technology to improve the Ghana Health Service's response to hypertension (high blood pressure) and other cardiovascular diseases, and to help patients to better manage these conditions (Lamptey et al., 2017). It includes five components:

- Strengthening the health system to better manage hypertension services, including a referral system between the national health system and private drug outlets
- Shifting screening, monitoring, and management services to community health officers and private drug outlets
- Training patients to manage their own hypertension and control other risk factors
- Leveraging technology to improve communication, education, clinical management, adherence, and health information management
- Minimizing out-of-pocket costs by ensuring health coverage by the Ghana National Health Insurance Scheme (National Academies of Sciences, Engineering, and Medicine, 2017)

In 1986, WHO held the First International Conference on Health Promotion in Ottawa, Canada. This conference led to the Ottawa Charter for Health Promotion, which provided a blueprint to achieve "Health for All" by the year 2000 (WHO, 1986). The Ottawa Charter proposed to situate health within the ambit of the individual, in addition to the broader social and structural context that government provides. This framework foreshadowed the importance of behavioral economics by indicating that "the healthier choice [will become] the easier choice" for promoting health.

Behavioral economics has emerged as a complementary approach to government interventions in health (**TABLE 8-15**). Pioneered by Daniel Kahneman and Amos Tversky, behavioral economic theory acknowledges that human decision making can be irrational. For example, individuals give greater weight to payoffs that are closer in the present (termed "present bias") and are more likely to select a smaller reward delivered in the short term than a larger award in the longer term (termed "hyperbolic discounting"). Behavioral economic strategies, aiming to nudge and reward individuals to reject these behaviors, have emerged to correct these decision-making "irrationalities" (Kahneman, 2011). Though government-led, these approaches to behavioral economics to change behaviors are not paternalistic. The U.S. and U.K. governments have embraced behavioral economics by establishing behavioral insight teams that apply research from behavioral economics and psychology to policy making to encourage healthy and other desirable behaviors.

Business

Some companies are starting to invest in the environment and society, realizing that nonfinancial performance impacts their financial bottom line. Moving beyond strategic philanthropy (charitable donations) and corporate social responsibility (sustainability activities), many companies are striving to create shared value (Porter & Kramer, 2011)—that is, business models that generate economic benefit, while addressing societal issues. This approach rests on the premise that companies must generate societal benefit at profit. As explained in **EXHIBIT 8-9**, there are three

TABLE 8-15 Government and Behavioral Economics Approaches to Health Promotion

	Government	Behavioral Economics
Intervention approach	Paternalistic	Nonpaternalistic
Target	Population	Individual
Examples	Directing behaviors through taxes, age and purchasing restrictions, education campaigns	Nudging behaviors through financial or nonfinancial incentives, discounts, or rewards

EXHIBIT 8-9 Classification of Companies Creating Value Beyond the Financial Bottom Line

1. **Companies promoting health:** The company develops products and services that are aligned with promoting better health. Companies pursuing this strategy most often focus on expanding the reach of their portfolio of offerings. Health and life insurers, workplace health providers, and drug and vaccine developers are examples.
2. **Companies undergoing transformations to advance health:** The company offers a mix of products and services that both promote and harm health. Companies adopting this approach work to lower the risks of their unhealthy products and improve the healthiness of their other offerings. Examples include major food and beverage companies.
3. **Companies harmful to health:** The company solely develops products and services that are harmful to human health. There is no intent to transform to develop healthier alternatives. Tobacco and firearms companies are examples.

TABLE 8-16 Corporate Reporting Platforms

Reporting Platform	Description
Dow Jones Sustainability Indexes	Launched in 1999 as the first global sustainability benchmark. Tracks company stock performance based on economic, environmental, and social criteria.
FTSE4Good	Ethical investment stock market indices launched in 2001 by the FTSE Group.
Global Reporting Initiative	Independent organization that helps organizations understand and communicate the impact of business on sustainability issues, including climate change, human rights, and corruption.
International Integrated Reporting Council	Global coalition of regulators, investors, companies, standard setters, the accounting profession, and nongovernmental organizations (NGOs) that establishes integrated reporting practices.
King Report on Corporate Governance	Guidelines for the governance structures and operation of companies in South Africa. Four reports have been issued to date: 1994 (King I), 2002 (King II), 2009 (King III), and 2016 (King IV).
Sustainability Accounting Standards Board	Nonprofit organization incorporated in 2011 to develop and disseminate sustainability accounting standards.
United Nations Global Compact	Voluntary initiative based on CEO commitments to implement universal sustainability principles.

classifications of companies that operate within a shared value lens.

To encourage companies to embrace this concept of shared value, corporate reporting platforms now encourage voluntary disclosures on the extent to which companies address environmental, social, and governance (ESG) indicators (**TABLE 8-16**). This information is often presented in a sustainability or integrated report published by the company.

Realizing the central role that health plays within the workplace, marketplace, and community, companies are beginning to explore how to report on their business's impact on health. For example, companies are investigating ways to indicate the health status of their employees, the extent to which health is considered in their products and services, or how they improve health within the communities where they operate or are located.

In the workplace, many companies have introduced programs to improve the health of employees by targeting major chronic disease risk factors, and thereby minimize their healthcare costs. Recent studies suggest a correlation between a company's investment in workplace health and its financial performance,

due to reduced healthcare costs, increased productivity, and improved financial gains. In a portfolio of U.S. companies that had received a designated workplace health award, the rate of return outperformed the Standard & Poor (S&P) 500 average over a 13-year time frame (Goetzel et al., 2016). This analysis was later replicated in South Africa using Discovery Ltd.'s Healthy Company Index, where the portfolio of healthy companies consistently outperformed the market (Conradie, van der Merwe Smit, & Malan, 2016). This work has also led to partnerships between businesses and community organizations to promote health (Oziransky, Yach, Tsao, Luterek, & Stevens, 2015).

United Nations

In addition to national governments and multinational businesses, international agencies such as the United Nations are increasingly responding to chronic diseases. The United Nations hosted its first High-level Meeting on Noncommunicable Diseases in 2011. UN member-states have agreed to convene a third High-level Meeting on chronic diseases in 2018 (Mendis, 2016). Additionally, the Sustainable Development Goals (SDGs), which emerged in 2015 from the Millennium Development Goals (MDGs), now incorporate multiple chronic disease goals and targets.

Sustainable Development Goals

Building on the eight MDGs proposed in 2000 and closed in 2015, the United Nations launched the SDGs. These 17 goals aim to end poverty, protect the planet, and ensure prosperity for all. Member-states agreed to the SDGs on September 25, 2015, and they came into force on January 1, 2016. Each goal has specific targets for 2030 (United Nations, 2016). The *Introduction* to this book lists all 17 goals.

Related to chronic diseases and sustainable development, SDG3 focuses on "good health and well-being." It incorporates targets against infectious and chronic diseases, with the aim of ensuring healthy lives and promoting well-being for all at all ages (GBD SDG Collaborators, 2015). This goal specifically aims to reduce by one-third premature mortality from noncommunicable diseases through prevention and treatment; promote mental health and well-being; provide access to affordable essential medicines and vaccines to all; and strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries.

Several other SDGs also affect chronic diseases, including SDG11 (sustainable cities and communities), SDG12 (sustainable consumption and production), SDG8 (decent work and economic growth), SDG5 (gender equality), SDG10 (reduced inequalities), SDG4 (inclusive and quality education for all and lifelong learning), and SDG17 (multi-stakeholder partnerships for the goals).

The United Nations has also launched a Global Compact (UNGC) that engages 8,600 businesses and 4,000 nonbusiness organizations from more than 170 countries. These partners have pledged to work to advance responsible and sustainable business practices, and invest in solutions for tackling societal challenges. The UNGC has recently announced plans to advance the SDGs by convening and catalyzing action from within the UN system, and with global businesses in the workplace, marketplace, and community.

World Health Organization

WHO is the dedicated specialized UN agency for health. It engages in chronic disease control both directly and through partnerships with other actors, such as member-states' governments. For example, under the leadership of Gro Harlem Brundtland, the Framework Convention on Tobacco Control (FCTC) was adopted in 2003 as the first international treaty on tobacco control. Since 2003, 177 countries have worked to implement the provisions (WHO, 2003b). More recently, the WHO introduced a Framework for Engagement with Non-State Actors (FENSA), which includes engagement by actors, including the private sector, NGOs, philanthropic foundations, and academia (WHO, 2016e).

Beyond the FCTC, WHO has pioneered a variety of new resolutions related to chronic diseases. In May 2016, the World Health Assembly agreed to a resolution on healthy aging. This agreement entails the creation of a global strategy and action plan on healthy aging between 2016 and 2020, with the overarching aim of having every country commit to actions that support older adults. For example, countries are expected to foster age-friendly environments, provide equitable and sustainable long-term care systems, and implement improved monitoring and research (WHO, 2015b). Stakeholders are further mobilizing to propose a resolution on physical activity to the World Health Assembly.

Lastly, WHO has led commissions related to chronic diseases and their associated risk factors. For example, the Commission on Ending Childhood Obesity was established in 2014. Its mandate was to "review, build upon and address gaps in existing

mandates and strategies in order to prevent infants, children and adolescents from developing obesity."

Donor Agencies

Despite the prevalence of chronic diseases, donor agencies (both governmental and civil society) have to date provided scant funding to prevention and treatment of chronic diseases (Greenberg et al., 2016) for various reasons. Most notably, interventions for chronic disease control are complex and require sustained efforts over multiple years. Their targets are, therefore, not usually achievable within the confines of a grant agreement or electoral cycle, leading to underfunding even in affluent nations. Perhaps for this reason, less than 10% of the U.S. National Institutes of Health's (NIH) $30 billion budget is allocated to behavioral interventions that target major modifiable chronic disease risk factors (Calitz, Pollack, Millard, & Yach, 2015). Similarly, the U.S. Agency for International Development (USAID) has spent almost nothing supporting chronic disease control as a donor agency, for the reasons cited in **EXHIBIT 8-10** (Holmes, 2016). Beyond the NIH and USAID, the total budget from the U.S. government for chronic diseases was $0 in 2013 (Ralston, Reddy, Fuster, & Narula, 2016).

EXHIBIT 8-10 USAID's Reasons for Neglecting Chronic Diseases

- **Our current job is not done.** Current health priorities are challenging enough.
- **Chronic diseases occur only in higher-income countries and populations.** This pervasive myth is still espoused within USAID.
- **Chronic diseases are not an urgent problem.** Chronic diseases are not an issue today, but rather a future health priority.
- **The current focus works well and is well funded.** There is no need to adapt or evolve, as existing health priorities demand a reliable funding stream.
- **Congress says no.** There is a perception that the U.S. Congress does not want USAID to explore new topics.
- **There is no funding.** Funding is in short supply in an era of financial austerity.
- **There are no good solutions and chronic diseases are not USAID's strong point.** Chronic diseases are complex and require a multisectoral approach.
- **USAID is contributing in some way.** USAID's efforts may spill over to chronic diseases.
- **The chronic disease community is easy to ignore.** The chronic disease community is too quiet, pedestrian, and polite to demand more action on this front.

Data from Holmes, P. (2016). USAID: Standing by on NCD. *Global Heart, 11*(4), 425–427.

Foundations and Nongovernmental Organizations

The largest source of global chronic disease funding is foundations and NGOs, which collectively provided 46% of total external support in 2015 (Nugent, 2016). Nonetheless, many remain skeptical about the extent to which these stakeholders can facilitate improvements in health. Much of their work has focused on educational and awareness materials, which are often ineffective in modifying behaviors. Additionally, some argue that behavioral change, and the desire to change, resides at the individual—and not at the institutional—level.

Among foundations, the Robert Wood Johnson Foundation (RWJF) is the largest philanthropic organization in the United States dedicated solely to better health. With an endowment of $9.2 billion, RWJF is working to build a culture of health by placing well-being at the center of every aspect of life. Bloomberg Philanthropies, founded by Michael Bloomberg, focuses on ensuring better and longer lives for the greatest number of people. Together with WHO, Bloomberg Philanthropies has established the Partnership for Healthy Cities, a global network of cities with $5 million in funding to develop and deliver interventions to save lives through the prevention of chronic diseases.

NCD Alliance is a network of 2,000 NGOs focused on chronic diseases. They have emerged as a recognized global leader on chronic disease policy, a convener of civil society movements, and a partner to governments and UN agencies (NCD Alliance, 2016). The Young Professionals Chronic Disease Network (YP-CDN) is another leading example of an organization founded (in 2009) to advocate for chronic diseases. Since its inception, YP-CDN has expanded to more than 7,000 people, and focuses largely on facilitating access to essential medicines in LMICs. Its petitions on essential medicines have led to the addition of 2% of all medicines to the WHO Essential Medicines List (Young Professionals Chronic Disease Network, 2016).

Academic Institutions

In 1913, the Rockefeller Commission's Welch–Rose Report advocated for the development of schools of public health to fight population-level causes of disease. Shortly thereafter in 1916, the Rockefeller

TABLE 8-17 Supporters and Opponents of Selected Policy Issues

Major Risk Factor	Policy Issue	Supporters	Opponents
Tobacco	Excise tax	Finance, World Bank	Tobacco industry
	Advertising bans	N/A	Advertisers, media, libertarians
	Smoke-free areas	Restaurants	Hospitality and restaurant sector
	Agricultural subsidies	Enlightened countries	Farmers, rural voters
Diet, nutrition	Advertising to children	N/A	Advertisers, multinational food companies, media
	Commodity changes, sugar	Fruit, vegetable farmers	Sugar farmers, producers, lobbyists
	Promotion to children	Sports, gyms	Sports, toys, fast-food industries

N/A = not applicable.

Foundation provided a grant to found the first school of public health, at Johns Hopkins University. To date, public health schools have largely focused on infectious diseases. In the United States, chronic diseases remain absent from the curriculum in schools of public health as well as medicine. Many other countries and regions, including Europe (especially the United Kingdom) and Canada, have made more progress in targeting chronic diseases in academia relative to the United States.

Partnerships for Chronic Disease Control: Challenges and Conflicts

Progress in infectious disease control is achievable with additional funding for surveillance, effective treatment, and new drugs and vaccines. It also requires general improvements in housing and related infrastructure (water, sanitation, and energy). None of these investments are considered politically contentious. In contrast, chronic disease prevention and control requires public health partners to urge individuals to stop smoking; eat less fat, sugar, and salt; engage in more physical activity; and eat more fruits, vegetables, nuts, and grains. These messages, and the policies that promote them, often prove controversial or even unacceptable to other stakeholders, such as private industry and its advocacy groups.

TABLE 8-17 summarizes policy issues prone to such conflict, which often requires resolution at a level of government outside of the health department. The table lists traditional opponents to healthy public policies, along with possible supporters of change. As noted earlier, tobacco use, unhealthy diet, and physical inactivity are major contributors to the burden of disease in both high-income countries and LMICs.

For example, the call to stop smoking has unified a variety of opposition groups—the tobacco industry itself, the hospitality and entertainment industries, farmers, advertising companies, and even some media outlets—frequently around false or misleading messages related to the economic impacts of smoking. Opponents of tobacco control have perpetuated myths including the following:

- *Restaurants and pubs will go bankrupt if smoke-free policies are introduced.* The opposite is the truth.
- *Finance departments will lose revenue from smuggling and reduced tax receipts if excise taxes increase.* Although smuggling may have a small impact on revenue, it can be lessened through customs and excise controls.
- *Tobacco farmers in countries such as Zimbabwe and Malawi will be unemployed in a few years as tobacco consumption declines.* Unfortunately from a public health perspective, tobacco consumption rarely drops faster than 2% per year, even in the face of

vigorous tobacco control campaigns. At those rates, and in the face of continued population growth, the demand for leaf tobacco will remain high for many decades. The immediate threat to African tobacco farmers comes more from the introduction of mechanization locally and subsidies in high-income countries, rather than from less smoking.

Similar conflicts have emerged around sugar control policies. During the development of the WHO Global Strategy on Diet, Physical Activity and Health, simple messages regarding moderate sugar consumption faced fierce opposition (A. Waxman, 2004; H. Waxman, 2004). Soda manufacturers have led the global efforts to deny that sugar causes obesity or dental caries, or that specific levels of sugars are desirable. Sugarcane farmers in LMICs are concerned that if new WHO/Food and Agriculture Organization (FAO) guidelines on sugar consumption were applied globally, they would lose their jobs. The economic stakes are greater for sugar than tobacco: The lobbying community is far larger and the evidence base on the economics of sugar use is not as well described.

For several years, proponents of antismoking campaigns prepared for critiques of any efforts to control tobacco use. These included engaging with the FAO, World Bank, International Monetary Fund (IMF), United Nations Children's Fund (UNICEF), and other UN partners, and jointly agreeing that the key tobacco policy goal was demand reduction. This harmony was later reflected in subsequent policy agreements. Similar work has yet to emerge with respect to many food policy issues, which are inherently more complex and involve a wider array of stakeholders. But as with tobacco (and opposite to what some lobbyists maintain), there will be only very modest impacts on the demand for sugar over the next few decades even if the WHO recommendations are fully implemented (LMC International, 2004).

New Initiatives

Access Accelerated. Twenty biopharmaceutical companies have partnered with the World Bank and the Union for International Cancer Control to address gaps in essential medicine access through a new initiative dubbed "Access Accelerated," which addresses key barriers among low-income populations. The initiative combines public, private, and philanthropic endeavors, and is evaluated by Boston University's Global Health department.

Resolve. In 2017, the former director of the U.S. Centers for Disease Control and Prevention (CDC) announced a $225 million initiative to address cardiovascular disease and epidemics through an initiative hosted at Vital Strategies, known as "Resolve." The initiative aims to save up to 100 million lives by scaling up proven interventions, including improved treatment of high blood pressure, elimination of artificial trans fats, and reduction in sodium consumption.

Other Collaborative Networks

Advocates for health promotion and chronic disease prevention have yet to coalesce around common messages or key themes. Different stakeholders support different interests within health. Until recently, public health would not collaborate with business, while policy makers often focused on curative care at the expense of chronic disease prevention.

Businesses are increasingly forming precompetitive partnerships to collectively advocate for better health. One example is Bupa's Chief Medical Officer (CMO) Network. This group convenes world-class clinicians to address the world's largest problems through workplace health initiatives. It has decided to focus on behavior change within the workplace as the first major target area. Other examples include the World Economic Forum's Council on Human-centric Health and the American Heart Association's CEO Roundtable, which productively engages for-profit and nonprofit partners to fight chronic disease.

Future Drivers for Prevention and Management of Chronic Diseases

Although existing chronic disease control work has been limited to date, and remains fraught by complex political and economic conflicts, multiple initiatives have demonstrated effective chronic disease control strategies. These tend to involve several common health system strategies, centered on the judicious use of scarce resources and on the structuring of care around prevention in addition to cure.

Management of Chronic Diseases by Healthcare Systems

Country governments, NGOs, businesses, and other international stakeholders have multiple tools to target the *population-level* determinants of chronic diseases (such as rising consumption of tobacco and sugar-sweetened beverages) using *population-level* interventions such as taxes and public education

campaigns. Nonetheless, local and national health systems must also respond to chronic diseases—through both prevention and treatment—at the level of *individual patients* and their communities. In lower- and higher-income countries, these interventions are still evolving. Most take aim at preventing or treating the core lifestyle risk factors for chronic disease (poor diet, tobacco use, sedentary activity), treating and preventing diseases that emerge from these conditions (hypertension, obesity), and treating and preventing the chronic conditions that emerge in turn from those disorders (congestive heart failure, stroke). Successful programs have taken many forms, but display several common features:

- The use of non-physician healthcare workers (NPHWs), including community health workers (CHWs)
- Leveraging or expanding existing programs for other diseases, such as HIV, to adapt to new conditions such as cardiovascular disease
- Using models of care that address multiple chronic disease simultaneously, such as hypertension and diabetes

These approaches use scarce resources effectively in LMICs, but are increasingly being applied to chronic disease care in high-income countries as well. Further research is needed on the most efficient way to design and evaluate these interventions.

In LMICs, there is a profound shortage of physicians, nurses, and other qualified health providers for patients with both chronic and acute conditions (Kar, Thakur, Jain, & Kumar, 2008; WHO, 2006b). In high-income countries, these providers are more abundant, but are often disproportionately involved in specialist care rather than the primary care activities most germane to prevention of chronic disease risk factors, and tend to concentrate in urban areas (Bodenheimer & Smith, 2013; Goodyear-Smith & Janes, 2008). As a result, local health systems have used staff with less formal training to complete tasks normally shouldered by these providers, a process called task-shifting (Callaghan, Ford, & Schneider, 2010; Federspiel et al., 2015; Joshi et al., 2014).

Task-shifting is not a new concept: Nonphysicians functioned as health officers in nineteenth century France, and so-called barefoot doctors provided widespread medical care to rural China in the mid-twentieth century. This work inspired the universal primary care movement of the late 1970s (Heller, 1978; Sidel, 1972) and many of the programs that grew out of it (Black et al., 2017; Mann, Eble, Frost, Premkumar, & Boone, 2010). However, the concept rose to prominence in the mid-2000s as a vehicle for the control of HIV/AIDS in lower-income countries, when the uncontrolled epidemic vastly outstripped the human resources available for its containment ("The 3 by 5 Initiative," n.d.; WHO, 2008b). By 2010, a systematic review of task-shifting approaches to the control of HIV in Africa found 51 separate studies with measurable outcomes (Callaghan et al., 2010). These largely demonstrated that NPHWs can increase access to medication and other treatment, at comparable cost-effectiveness to physician care models and with no change in quality of care.

Based on these data, delivery programs have increasingly used NPHWs for the screening and control of chronic diseases, with similar results. For example, studies in India and Pakistan have demonstrated that nonphysician health workers can screen for persons at high risk of cardiovascular disease with good accuracy, agreeing with physicians in 89% of cases (Abegunde et al., 2007; Joshi et al., 2012). Further work has corroborated this result in South Africa, Guatemala, Mexico, and Bangladesh (Gaziano et al., 2015; Gaziano et al., 2013), and shown its feasibility for other chronic conditions such as depression (Adams, Almond, Ringo, Shangali, & Sikkema, 2012) and oral and cervical cancer (Gajalakshmi, Krishnamurthi, Ananth, & Shanta, 1996; Swai et al., 2005; Warnakulasuriya et al., 1984). For some conditions, such as cardiovascular disease, simplified screening algorithms have facilitated this process, both by avoiding blood tests and other often-unavailable investigations, and by approximating complex decision matrices with a few key criteria that NPHWs can apply even with incomplete knowledge of medical physiology (Fernandez-Alvira et al., 2017; Gaziano, Young, Fitzmaurice, Atwood, & Gaziano, 2008; WHO, 2017a).

NPHWs can also provide treatment for chronic conditions using related algorithms. These include prescribing medications for conditions including hypertension (Kengne, Awah, Fezeu, Sobngwi, & Mbanya, 2009; Ogedegbe et al., 2014; Vedanthan et al., 2017), diabetes (Kengne et al., 2009; Labhardt, Balo, Ndam, Grimm, & Manga, 2010), and asthma (Kengne et al., 2008), as well as counseling for conditions such as depression (Chibanda et al., 2011; Patel et al., 2010) and tobacco cessation (Siddiqi et al., 2013). Increasingly, WHO and other international organizations have developed algorithms that leverage task-shifting (as well as task-sharing, in which doctors aid NPHWs in providing care) for cost-effective integrated management of chronic diseases (WHO, 2004, 2017a). In part as a result of these successes, models using CHWs and other NPHWs to help patients control chronic conditions are now increasingly common in

high-income countries as well. One example is City Health Works (2017) in New York City.

The optimal role of NPHWs in chronic disease care is incompletely understood, and likely depends on the context of the local health system. Systematic reviews have demonstrated these workers' efficacy (Joshi et al., 2014; Mutamba, van Ginneken, Paintain, Wandiembe, & Schellenberg, 2013; Khetan et al., 2017), but also document such barriers as skepticism toward permitting NPHWs to prescribe medications, lack of sufficient supplies at the NPHW clinic level, limited formal NPHW training, and difficulty tracking patient records (Joshi et al., 2014). Conversely, health systems that provide short, practical NPHW trainings; that permit these workers to have sufficient autonomy; and that ensure they have reliable supplies for practice have reported more success (Joshi et al., 2014). NPHWs are an essential tool for chronic disease care, but their role must be properly clarified and adapted to the context of the local care delivery system, in both high-income countries and lower-income countries.

Leveraging or Expanding Programs for Other Conditions

Task-shifting and NPHW-led care rose to recent prominence during the mid-2000s when the HIV/AIDS pandemic in LMICs was at its height and medications and human resources were severely inadequate to cope with the disease burden imposed by that pandemic. In part due to improved clinical outcomes in persons living with HIV and AIDS (PLWHA), chronic conditions have become more prevalent in this population as they age (Kwarisiima et al., 2016; Rabkin, Kruk, & El-Sadr, 2012). Moreover, HIV infection and treatment are associated with many chronic conditions, such as cardiovascular disease, stroke, and multiple types of cancer (Narayan et al., 2014). Additionally, the mechanics of modern HIV/AIDS care—which now usually involves universal screening, lifestyle counseling, and medical treatment for all persons with a positive test—closely resemble validated approaches to the control of chronic conditions such as hypertension and diabetes (Chamie et al., 2012).

As a result, HIV/AIDS programs in LMICs are increasingly leveraging their resources to concurrently screen for chronic conditions in both HIV-positive and HIV-negative persons using physicians and NPHWs. The Sustainable East Africa Research in Community Health (SEARCH) study, for example, is a massive randomized trial of 300,000 persons in Uganda and Kenya aimed at establishing whether screening entire communities for HIV/AIDS—and ensuring adequate treatment of all PLWHA—can arrest the spread of HIV (SEARCH, n.d.). SEARCH has also succeeded in screening tens of thousands of people for hypertension and diabetes in the communities, and consistently linked those persons with a positive test to follow-up care (Chamie et al., 2012; Kotwani et al., 2014). Other studies have also shown the efficacy of this model in other contexts (Janssens et al., 2007) and for other conditions such as depression (Adams et al., 2012). AMPATH's model, for example, has focused on HIV and chronic diseases such as Burkitt's lymphoma since its inception in the 1990s, and now provides NPHW-led hypertension care (Vedanthan et al., 2014). Although there are limited examples, recent meta-analyses have demonstrated that these programs are largely effective (Haldane et al., 2018). Predictors of success included the use of multidisciplinary teams such as pharmacists and other NPHWs as well as engagement with community leaders and members (Haldane et al., 2018).

Programs for chronic conditions can also be integrated into other existing care structures such as programs related to maternal and child health. As an example, a study is under way in northern Ghana that will leverage the Community-Based Health Planning and Services (CHPS) program, which has used community health nurses to decrease maternal and under-5 child mortality through education and referral, for the screening and treatment of risk factors for cardiovascular disease (Phillips, 2016–2018).

Integrating Multiple Chronic Conditions

Achieving control of chronic conditions in resource-poor settings requires careful parsimony—for example, using nonphysicians when doctors are unavailable, or using existing health programs rather than building new ones. Further efficiency is achievable by focusing on more than one chronic condition using the same cadre of staff and resources. Cardiovascular epidemiologic data demonstrate that it is less effective to treat persons with each major cardiovascular disease risk factor separately (such as high blood pressure and smoking) than to calculate the overall risk of an individual based on these factors and provide integrated care for all such persons (WHO, 2007). WHO's (2017a) HEARTS initiative is aimed at providing such care, although controversy remains over whether it has addressed all elements of heart disease care (Kishore, Heller & Vasan, 2018). A predecessor of the HEARTS protocol was implemented successfully in China and Nigeria (Mendis et al., 2010), and studies are under way in Jordan and Uganda, among other sites, to implement this approach (Collins et al., 2017; Sandy Gove, personal communication, 2017).

Although models like HEARTS for the integrated care of diabetes, hypertension, and other cardiovascular disease risk factors have become more common (Chamie et al., 2012; Coleman, Gill, & Wilkinson, 1998; Labhardt et al., 2010), programs that integrate cardiovascular disease care with care of other chronic conditions such as asthma or epilepsy remain rare (Kengne et al., 2008; Labhardt et al., 2010). In high-income countries, where chronic diseases already constitute nearly the entire disease burden, persons who suffer from multiple concurrent chronic conditions often experience poor health outcomes and struggle to access consistent preventive care. In addition to CHW-led models, new research aims to build primary care systems focused on more effective management.

Characteristics of Effective Systems of Care for Chronic Diseases

Health care for patients with chronic conditions requires a fundamental change in perspective from the familiar acute care model. The magnitude of this challenge is eased somewhat by the fact that chronic conditions share many common features. Whereas biomedical management changes depending on the unique features of the specific disease, the general components of care organization and delivery for patients with chronic conditions are essentially the same. These components include a well-defined care plan, patient self-management, scheduled follow-up appointments, monitoring of outcome and adherence, and stepwise treatment protocols. Collectively, these approaches represent a significant shift in healthcare practices. The differences between typical current and desired future approaches are described in the following subsections.

Patient-Centered Care

Patient-centered care recognizes the patient as a person; fully informs patients about the risks and benefits of treatment options; tailors decision making in response to individual patients' values, needs, and expressed preferences; shares power and responsibility among patients and providers; and develops patients' abilities to participate in their care. Across its multiple meanings, research shows that patient-centered care is crucial for obtaining good outcomes for chronic conditions.

Several experiences within LMICs have demonstrated the utility of patient-centered care across diverse cultures and resource contexts. WHO's Integrated Management of Adult Illness (IMAI) general principles of chronic care, for example, focus on equipping first-level healthcare workers to provide patient-centered health care. Specifically, the guidelines and related training materials prepare such workers to solicit patients' concerns and preferences, work in collaboration with patients to decide specific goals and treatment plans, and support patients in their daily efforts regarding prevention, medication adherence, and self-management.

Early results indicate that this approach is understandable and usable by first-level health workers. To date, physicians, nurses, and lay providers have been trained in this approach in Burkina Faso, Burundi, Ethiopia, Sudan, and Uganda. In Shanghai, China, a community-based chronic disease self-management program was shown to improve health status and reduce hospitalizations among patients with hypertension, heart disease, chronic lung disease, arthritis, stroke, and diabetes. Participants learned to take responsibility for the day-to-day management of their disease and the physical and emotional problems caused by their disease. The program was led by lay people with chronic conditions, who followed a detailed leader's manual throughout the program (Fu et al., 2003).

Emphasis on Primary Health Care

In LMICs, patients with chronic conditions present and need to be managed mainly at the primary healthcare level. This represents a departure from the approach used in healthcare systems that are driven by tertiary-care, specialty settings. Oman has successfully made the shift to a decentralized primary healthcare system, with health programs and activities in this country now being coordinated with the regional health services via referrals and linkages (WHO, 2002a). Similarly, the health policy of the Islamic Republic of Iran is based on primary health care, with particular emphasis on the expansion of health networks and programs in rural areas.

Population-Based Care

Health care for chronic conditions is most effective when policies, plans, and practices prioritize the health of a defined population rather than the single unit of a patient seeking care. A population focus implies that healthcare systems assess and monitor the health of communities, emphasize prevention and promote healthy behavior, assure universal access to appropriate and cost-effective services, and contribute

to the evidence base for effective treatments and systems of care.

Cuba's family doctor program is a notable application of population-based care. Each family doctor is responsible for the general health of the entire population in a small, defined area. Physicians are expected to provide preventive, maternal, and curative services to children and adults, and to monitor all patients with chronic conditions. They live in the communities that they serve, often residing in the same apartment block as their patients. In addition to engaging in medical consultations, Cuba's family doctors play an active role in promoting health among the communities they serve. They provide informal advice and counseling to community members, and they run regular prevention and self-management groups concerning a range of issues. They are also expected to set a positive example for their patients in the conduct of their day-to-day lives (Warman, 2001).

Proactive Care

Proactive care anticipates patients' needs rather than relying on a patient-initiated, often acute care–focused interaction. In rural South Africa, a proactive noncommunicable disease management program for hypertension, diabetes, asthma, and epilepsy was established within primary health care. This program emphasized planned care: Clinic-held treatment cards and registries were introduced, and diagnostic and management protocols were followed, which included regular, planned follow-up with a clinic nurse. Using this proactive care approach, nurses were able to achieve good disease control among most of the patient population—68% of patients with hypertension, 82% of those with diabetes, and 84% of those with asthma (Coleman et al., 1998).

A Model of Care: Innovative Care for Chronic Conditions

The WHO has developed a model based on these approaches. The Innovative Care for Chronic Conditions (ICCC) framework provides a roadmap for decision makers who want to improve their health system's capacity to manage chronic conditions (WHO, 2002b) (**FIGURE 8-5**). This framework is composed of fundamental components within the levels of patient interactions, organization of health care, community, and

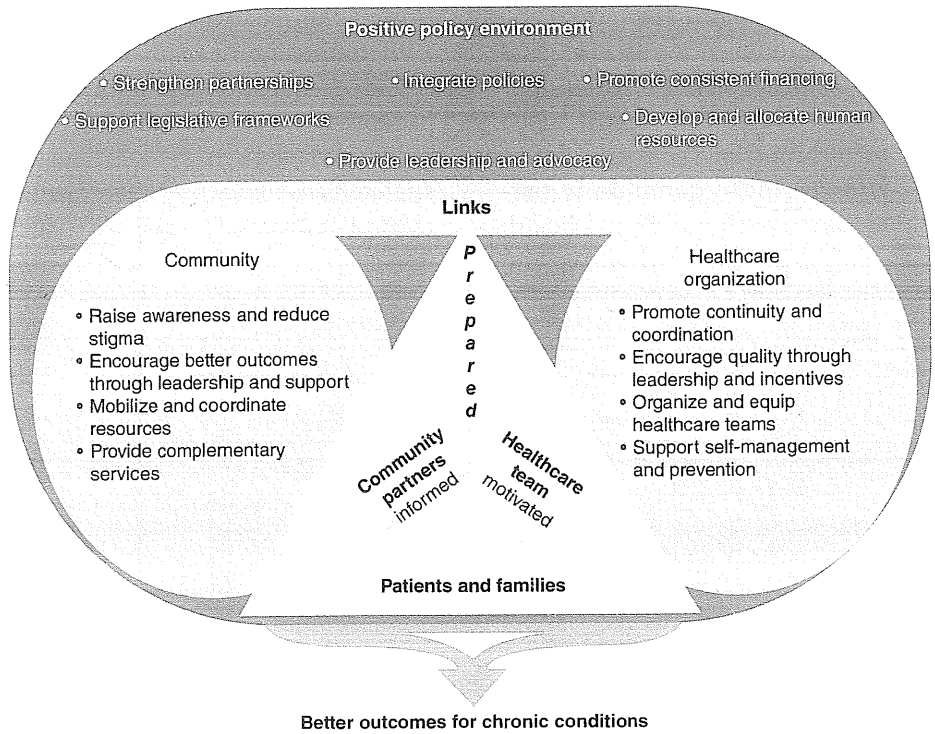


FIGURE 8-5 The World Health Organization's Innovative Care for Chronic Conditions framework.

Reprinted from World Health Organization (WHO). (2002). *Innovative care for chronic conditions: Building blocks for action.* Retrieved from http://www.who.int/chp/knowledge/publications/icccglobalreport.pdf

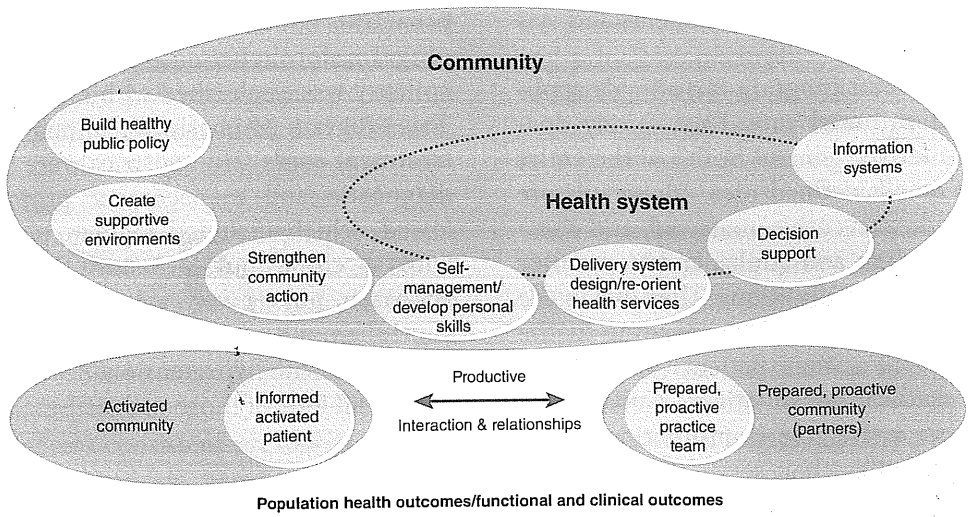


FIGURE 8-6 The expanded chronic care model.

Reproduced with permission from Barr, V. J., Robinson, S., Marin-Link, B., Underhill, L., Dotts, A., Ravensdale, D. et al. (2003). The expanded Chronic Care Model: An integration of concepts and strategies from population health promotion and the Chronic Care Model. *Hospital Quarterly, 7*, 73–82.

policy. These components are described as building blocks that can be used to help decision makers progressively create or redesign a healthcare system to expand its capacity to manage long-term health problems. Although the framework does not prescribe specific changes that must be tailored to unique needs and resources, it highlights the need for comprehensive system design or change in the requirements for effective care.

Barr et al. (2003) have also proposed an expanded chronic care model (**FIGURE 8-6**) that emphasizes the inclusion of elements of the population health promotion field so that broad-based prevention efforts, recognition of the social determinants of health, and enhanced community participation can all be part of the work of health system teams as they address the prevention and control of chronic diseases. **TABLE 8-18** compares the components of the expanded chronic care model with those of the chronic care model developed by Wagner and colleagues (1996).

Comprehensive Care Applied to Clinical Prevention

The preponderance of evidence suggests that effective healthcare strategies for reducing risk do exist, but tend to be weakly implemented (Coffield et al., 2001). Many professional competencies for delivering effective clinical prevention are outside the scope and culture of clinical medicine, so healthcare professionals frequently have little or no training in the skills required to improve care (Glasgow, Orleans, & Wagner, 2001).

Many opportunities for better integration of the treatment of chronic diseases and the prevention of risk factor behaviors remain largely untapped. For example, stronger support for smoking cessation among patients with TB would save lives in the long term, and smoking cessation among patients with congenital heart disease is the single most effective intervention for reducing mortality in these patients who smoke. As demonstrated by the 36% reduction in the relative risk of mortality among patients with congenital heart disease who quit tobacco use, smoking is at least as important as other secondary prevention measures such as use of statins (a 29% reduction), aspirin (15%), beta blockers (23%), or angiotensin-converting enzyme (ACE) inhibitors (23%) (Critchley & Capewell, 2003). Smoking cessation is also a priority for people with mental disorders. In one of the major studies on comorbidity between tobacco use and depression, researchers found that people with mental disorders are almost twice as likely to smoke as individuals without such disorders. Further, they found that people with a mental disorder had consumed 44.3% of all cigarettes smoked by a nationally representative sample in the previous days (Lasser et al., 2000).

Another challenge is that effective clinical prevention services must extend beyond the mere provision of information to patients. The era of exhortation by healthcare professionals to "eat better" or "drop some weight" is long past: Modern, evidence-based interventions emphasize shared decision making and collaborative goal setting among providers and patients (Serdula, Khan, & Dietz, 2003). The clearer and more personalized

TABLE 8-18 Comparison of the Chronic Care Model with the Expanded Chronic Care Model

Components of the Chronic Care Model		Components of the Expanded Chronic Care Model		Examples
Health system—organization of health care	Program planning that includes measurable goals for better care of chronic illness			
Self-management support	Emphasis on the importance of the central role that patients have in managing their own care	Self-management/develop personal skills	Enhancing skills and capacities for personal health and wellness	▪ Smoking prevention and cessation programs ▪ Seniors' walking programs
Decision support	Integration of evidence-based guidelines into daily clinical practice	Decision support	Integration of strategies for facilitating the community's abilities to stay healthy	▪ Development of health promotion and prevention "best practice" guidelines
Delivery system design	Focus on teamwork and an expanded scope of practice to support chronic care	Delivery system design/reorient health services	Expansion of mandate to support individuals and communities in a more holistic way	▪ Advocacy on behalf of (and with) vulnerable populations
Clinical information systems	Developing information systems based on patient populations to provide relevant client data	Information system	Creation of broadly based information systems to include community data beyond the healthcare system	▪ Emphasis in quality improvement on health and quality of life outcomes, not just clinical outcomes ▪ Use of broad community needs assessments that take into account: ◦ Poverty rates ◦ Availability of public transportation ◦ Violent crime rate
Community resources and policies	Developing partnerships with community organizations that support and meet patients' needs	Build healthy public policy Create supportive environments Strengthen community action	Development and implementation of policies designed to improve population health Generating living and employing conditions that are safe, stimulating, satisfying, and enjoyable Working with community groups to set priorities and achieve goals that enhance the health of the community	▪ Advocating for/developing: ◦ Smoking bylaws ◦ Walking trails ◦ Reductions in the price of whole-wheat flour ◦ Maintaining older people in their homes for as long as possible ◦ Work toward the development of well-lit streets and bicycle paths ◦ Supporting the community in addressing the need for safe affordable housing

Reproduced with permission from Barr, V. J., Robinson, S., Marin-Link, B., Underhill, L., Dotts, A., Ravensdale, D. et al. (2003). The expanded Chronic Care Model: An integration of concepts and strategies from population health promotion and the Chronic Care Model. *Hospital Quarterly, 7*, 73–82.

the goal, the better (Estabrooks, Glasgow, & Dzewaltowski, 2003). Skill building to overcome barriers, self-monitoring, personalized feedback, and systematic links to community resources such as peer support groups are other important elements for success (Steptoe et al., 2003). Many healthcare settings deliver these kinds of interventions in group formats, which enhances the efficiency of healthcare professionals and provides the added element of social support (Noel & Pugh, 2002).

Comprehensive Care Applied to Adherence

The ICCC framework recognizes the importance of treatment adherence as a primary determinant of the effectiveness of treatment. Good adherence confers both health and economic benefits. Adherence has been associated with improved blood pressure control (Luscher, Vetter, Sigenthaler, & Vetter, 1985) and lessened complications of hypertension (Morisky et al., 1983; Psaty, Koepsell, Wagner, Lo Gerfo, & Inui, 1990). Despite the clear importance of treatment adherence, a number of rigorous reviews have found that in high-income countries, adherence among patients with chronic diseases averages only 50%; it is even lower in LMICs. In Gambia, China, and the United States, for example, only 27%, 43%, and 51%, respectively, of patients adhere to their medication regimen for high blood pressure. Similar patterns have been reported for other conditions, such as depression (range of 40% to 70%), asthma (43% for acute treatments and 28% for maintenance), and HIV/AIDS (range of 37% to 83%) (WHO, 2003a).

Adherence is a complex behavioral process that is influenced by five interacting dimensions: social and economic factors, healthcare system factors, condition-related factors, therapy-related factors, and patient-related factors. Because each dimension plays an important role in determining adherence rates (WHO, 2003a), all of them should be considered when designing interventions to improve outcomes. The most effective interventions have been shown to be multilevel, targeting more than one factor with more than one intervention (Dickinson, Wilkie, & Harris, 1999).

Contemporary perspectives have pointed out the importance of conceptualizing adherence as the active, voluntary involvement of the patient in the management of his or her disease, including a mutually agreed-upon course of treatment and sharing of responsibility between the patient and healthcare providers (Flood & Chiang, 2001). According to these perspectives, adherence is an active, responsible, and flexible process of self-management, in which the person strives to achieve good health by working in close collaboration with healthcare staff instead of simply following rigidly prescribed rules.

Summary of Effective Health Care

Reviews of interventions to improve health care for chronic conditions have demonstrated the importance of using multifaceted approaches as opposed to "magic bullet" or "single lever" interventions (**TABLE 8-19**) (Grimshaw et al., 2001; Renders et al., 2002; Wagner et al., 2001). Models of integrated, coordinated care, such as the ICCC framework, capture this complexity in an organized way.

Several key concepts have emerged from research within this area. First, it is necessary to work across multiple levels in a coordinated fashion to effect meaningful change in health care for chronic diseases. Second, organized systems of care—not just individual healthcare workers—are essential in producing positive outcomes for chronic disease. Third, it is crucial to work across the disease continuum in a comprehensive way. Comprehensive care for chronic conditions must span the full range of phases from clinical prevention, to treatment, to rehabilitation, to palliation (see **EXHIBIT 8-11**).

Healthcare Access and Quality

WHO has introduced a range of tools to support the management of chronic diseases that aim to impact healthcare access and quality. These have included the Package of Essential Medicines and Technologies for Noncommunicable Disease Interventions (PEN) and the HEARTS protocol, whose initial emphasis is on cardiovascular health. The HEARTS protocol includes the following elements:

H: healthy lifestyle

E: evidence-based treatment protocols

A: access to essential medicines and technologies

R: risk-based management

T: task-shifting and team-based care

S: systems for monitoring (WHO & CDC, 2017)

These guidelines, toolkits, and roadmaps are being co-developed for use at four levels: community, facility, district, and national, and are meant to guide decision making in the face of a paucity of domestic financing.

A growing body of work on implementation science in the public and private sectors has emerged to

TABLE 8-19 Stepwise Policy and Program Targets for National Prevention and Control of Chronic Diseases

Resource Level	Population Approaches		Individual High-Risk Approaches
	National Level	Community Level	
Step 1: Core	The WHO Framework Convention on Tobacco Control (FCTC) is ratified in every country. Tobacco control legislation consistent with the elements of the FCTC is enacted and enforced. A national nutrition and physical activity policy consistent with the global strategy is developed and endorsed at the cabinet level, including laws. Health impact assessment of public policy is carried out; priority areas include transport, urban planning, taxation, trade, and agriculture.	Local infrastructure plans include the provisions for and maintenance of accessible and safe sites for physical activity (e.g., parks and pedestrian-only areas). Health-promoting community projects include participatory actions to cope with the environmental factors that increase individuals' risk of chronic diseases—inactivity, unhealthy diet, and tobacco and alcohol use. Active health promotion programs focusing on chronic diseases are implemented in different settings (e.g., villages, schools, workplaces) and explicitly aim to reach poor communities.	Context-specific guidelines for chronic disease prevention and control have been adopted and are used at all healthcare levels. A sustainable, accessible, and affordable supply of appropriate medication is assured for priority chronic diseases. A system exists for the consistent, high-quality application of clinical guidelines and for the clinical audit of services offered. A proactive follow-up system for patients with diabetes and hypertension is in operation.
Step 2: Expanded	Tobacco legislation provides for incremental increases in taxes on tobacco, and a proportion of the revenue is earmarked for health promotion. Food standards legislation is enacted and enforced; it includes nutrition labeling. Sustained, well-designed, national programs (counter advertising) are in place to promote nonsmoking lifestyles, consumption of fruits and vegetables, and physical activity. Country standards are established that regulate marketing of unhealthy food to children.	Sustained, well-designed programs are in place to promote tobacco-free lifestyles (e.g., smoke-free public places, smoke-free sports). Healthy diets (e.g., low-cost, low-fat foods; fresh fruit and vegetables). Physical activity (e.g., "movement") in different domains (occupational and leisure).	Systems are in place for selective and targeted prevention aimed at high-risk populations, based on absolute levels of risk. Publicly financed "quit-line" for smokers; weight control line.
Step 3: Optimal	Policies shown to work for chronic disease prevention and control are implemented. There is policy coherence between agricultural systems and chronic diseases. Country standards are established that regulate marketing of unhealthy food to children.	Recreational and fitness centers are available for community use.	Opportunistic screening, case-finding, and management programs are implemented. Self-management groups are fostered for tobacco cessation and overweight reduction. Appropriate diagnostic and therapeutic interventions are implemented.

Modified from World Health Organization (WHO). (2003). *World health report, 2003*. Retrieved from http://apps.who.int/iris/bitstream/10665/42789/1/9241562439.pdf

EXHIBIT 8-11 Case Study: Hypertension

Two of us (DJH and SPK) have argued that an approach to medication access used for HIV/AIDS mobilization should be leveraged for hypertension, the leading risk for cardiovascular disease (Heller & Kishore, 2017). Leveraging lessons learned from HIV/AIDS and infectious disease programs, we believe it is crucial to focus on the gap—and outline steps to close it.

> Antihypertensive medicines, called thiazides, can close the treatment gap for less than $20 per person per year. Over a decade, they could save almost 5 million lives worldwide, at a cost under $9 billion per year: significantly less than the estimates that galvanized the global HIV community 15 years ago. Thiazides are the initial medication of choice for blood pressure control in nearly all settings. Although developed in 1958, they remain a drug of first resort, according to the International Society for Hypertension (ISH), European Society for Cardiology, and others (James et al., 2014; Mancia et al., 2013; WHO, 2007). They are also generic, costing a dollar or less per year in developing countries (Partners in Health, Bukhman, & Kidder, 2011). Although they require annual blood tests and doctor visits to screen for (rare) changes in kidney function, groups such as Partners in Health (2011) have treated patients with hydrochlorothiazide for $4–13 per year in settings like Rwanda.
>
> As in the early days of HIV control, conventional wisdom holds that universal hypertension treatment is prohibitively expensive. In 2007, WHO and ISH published guidelines arguing that only high-risk persons should receive antihypertensive medications, because "treatment of [hypertensive] patients with very low cardiovascular disease risk may be cost-effective only if inexpensive antihypertensive drugs are used" (WHO, 2007). Subsequent studies concurred (Gaziano, 2008; Ilesanmi, Ige, & Adebiyi, 2012), with one case finding many patients spent 10% or more of their annual income on antihypertensive medications (Ilesanmi et al., 2012) Yet recent data suggest universal treatment is now cost-effective and a better value than HIV/AIDS treatment at the dawn of the Global Fund and PEPFAR. Partners in Health (2011) pays $0.3 cents per thiazide tablet in Rwanda or $1.03 per patient-year of treatment. Patients requiring further treatment receive amlodipine, whose annual cost is $4.69. Each patient also receives one to two clinic visits per year at $3 each, as well as laboratory tests costing $0.17 per check. Conservatively, assuming that all patients require two medications, clinic visits, and laboratory tests per year, these results correspond to a per-patient annual cost of $12.90. Mills et al. (2016) report that about 32% of all adults in LMICs have hypertension—approximately 1.039 billion people. Some 11.6% have chronic kidney disease, according to a recent systematic analysis (Mills et al., 2015), or other severe hypertension (9.1% in Partners in Health's cohort) requiring treatment beyond thiazides and amlodipine (Partners in Health, 2011). Of the remaining 830 million, 29% are currently treated (Mills et al., 2016), leaving 589 million persons in need of treatment worldwide.

Reproduced from Heller D. J., Kishore S. P. (2017). Closing the blood pressure gap: An affordable proposal to save lives worldwide. *BMJ Global Health 2*:e000429, with permission from BMJ Publishing Group Ltd.

champion appropriate models. For example, *The Lancet*'s Commission on NCDs and Injuries provides tools for national ministries to execute better care on chronic diseases (*The Lancet* NCDI Poverty Commission, 2017). Moreover, while antiretroviral drugs (ARVs) for HIV/AIDS can cost $3,500 or more annually, access to low-cost, first-line treatments for hypertension such as thiazides could be achieved for less than $20 per person (Partners in Health, Bukhman, & Kidder, 2013).

A Model of Care: Innovative Care for Chronic Conditions

New models exist on how to best tackle chronic conditions in resource-poor communities. As an example, AMPATH in Eldoret, Kenya, has pioneered an innovative model for caring for patients with chronic illnesses (**FIGURE 8-7**). This model is based on the HIV model that is shifting toward population health, to include income, food security, clinical care delivery for chronic diseases, as well as community partnerships and social networks that are durable and long-lasting.

This shift toward population health is being mirrored by other academic initiatives such as global health partnerships amplified by the research outputs of the Fogarty Institute for Innovation and other global health institutes across the globe. A key emphasis of this model is team-based care and task-shifting to ensure that nurse- and community health worker-driven models are scaled appropriately, including in rural settings. Adherence and linkage to care are hallmarks of the approach. These models are patient centered, population based, data driven, and proactive (rather than reactive).

Cost-Effectiveness

Chronic disease interventions, including medications, often have low costs and no patent protection. Many of these interventions are also listed on WHO's Essential Medicines List, which guides national purchasing,

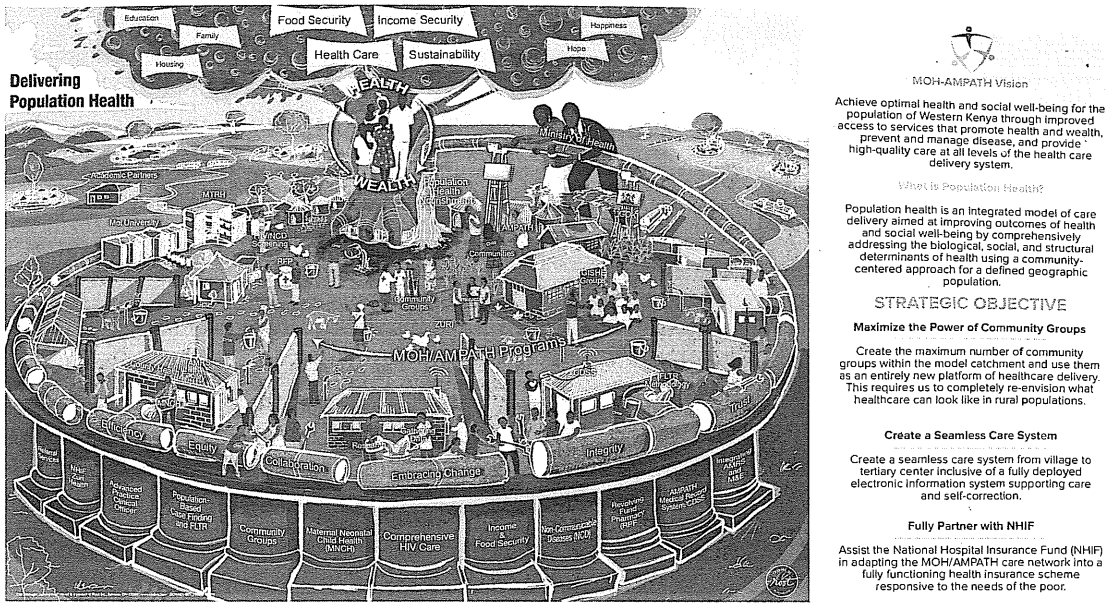


FIGURE 8-7 AMPATH's framework for population health.

The Root Learning Map® visual was created by Root Inc and provided courtesy of AMPATH.

procurement, and distribution at districts and facilities. With the exception of oncologic products (e.g., trastazumab for *HER2*-positive breast cancers), these tools are cost-effective per established WHO standard (cost ÷ DALY is less than 3 times the gross national income per capita).

One fast-growing movement is coalescing around the use of a multidrug regimen in a single fixed-dose combination—known as the polypill—for use for cardiovascular disease. This tool could be rapidly deployed for primary and secondary prevention to promote adherence and deliver clinical results across meaningful population sizes at low cost.

Reorientation of Health Services to Address Chronic Disease

Many lives continue to be lost prematurely because of inadequate treatment and long-term management of chronic diseases, even though simple and inexpensive approaches to address these diseases exist. Even in high-income countries, the full potential of these interventions is not realized. The situation in both poorer countries and poor communities within rich countries is even less satisfactory. In most countries, effective means of preventing, treating, and providing palliative care for cancer exist, but are not broadly implemented. There are many opportunities for coordinated risk reduction, care, and long-term management of chronic disease. For example, smoking cessation is a priority for all patients who smoke; dietary and physical activity information and skill building should be provided to most patients in virtually all healthcare settings. Unfortunately, few efforts have been made to explicitly target poor communities with such interventions.

Considerable progress has been made in improving access to, and reducing the prices of, antiretroviral agents for HIV/AIDS, drugs to treat TB, and several vaccines. Similar progress has yet to be made for essential drugs that are required to improve survival for treatable cancers, diabetes, and cardiovascular disease. A patient with heart disease in a poor nation has the same right to effective drug treatment as a patient with malaria, tuberculosis, or HIV/AIDS. NGOs have yet to advocate as effectively for better access to chronic disease treatment as they have for selected infectious diseases, despite the huge savings in lives and suffering that would result from broader access to such health care.

Continued strengthening of certain aspects of infectious disease control, particularly those related to chronic infectious diseases such as TB and HIV/AIDS, will in turn benefit the control of cardiovascular disease, diabetes, and cancer. The same transformation of healthcare systems is required to address prevention and long-term disease management for both infectious and noninfectious chronic diseases. In sub-Saharan African countries, an opportunity exists to ensure that the new platforms for health services delivery that are being built to expand access to treatment for HIV/AIDS also address noninfectious chronic diseases. The marginal increased investments required to provide this more comprehensive infrastructure would, in all likelihood, yield substantial gains for public health among poor communities whose members already suffer from cardiovascular disease, diabetes, and cancer.

Summary

It is often stated that "An ounce of prevention is worth a pound of cure." Yet too often, treatment is valued over prevention. This emphasis is maintained despite evidence suggesting the cost-effectiveness of prevention interventions compared to treatments for chronic diseases. One major driving factor underlying this phenomenon is the time value of prevention versus treatment. Prevention saves statistical figures in the future, yet treatment saves real people today. In too many instances, this factor leads to treatment being prioritized over prevention.

This chapter has presented the urgent case for acting on chronic diseases today and not tomorrow. It defined and outlined the global prevalence of chronic diseases, their health and economic impact, and their four key risk factors; described stakeholder efforts to date in chronic disease prevention; and proposed stakeholder actions that can further control the rising prevalence of chronic diseases. To fully realize these objectives and to place these actions and activities in context, **FIGURE 8-8** presents a graphic of major milestones in chronic disease prevention. It includes future predictions related to chronic diseases through the year 2030, when the United Nations measures progress against the SDGs.

To assist students planning careers related to chronic diseases, we have also developed a roadmap on potential future developments in health. This roadmap (**EXHIBIT 8-12**) lists multiple often-uncharted paths for action and advocacy against chronic conditions in the context of the SDGs.

Discussion Questions

1. What are the leading risk factors that contribute to death and disability globally? How do these risk factors compare between LMICs versus high-income countries?
2. Given current trends in risk factors, what are likely to be the major causes of death and disability in LMICs versus high-income countries over the next decade?
3. Which policies and actions taken at national and international levels could influence trends in chronic disease and their associated risk factors? Which indicators might facilitate their implementation?
4. Describe how globalization could be positively harnessed for chronic disease prevention. In doing so, consider how public–private partnerships involving major multinational corporations could play a more effective role in promoting health.

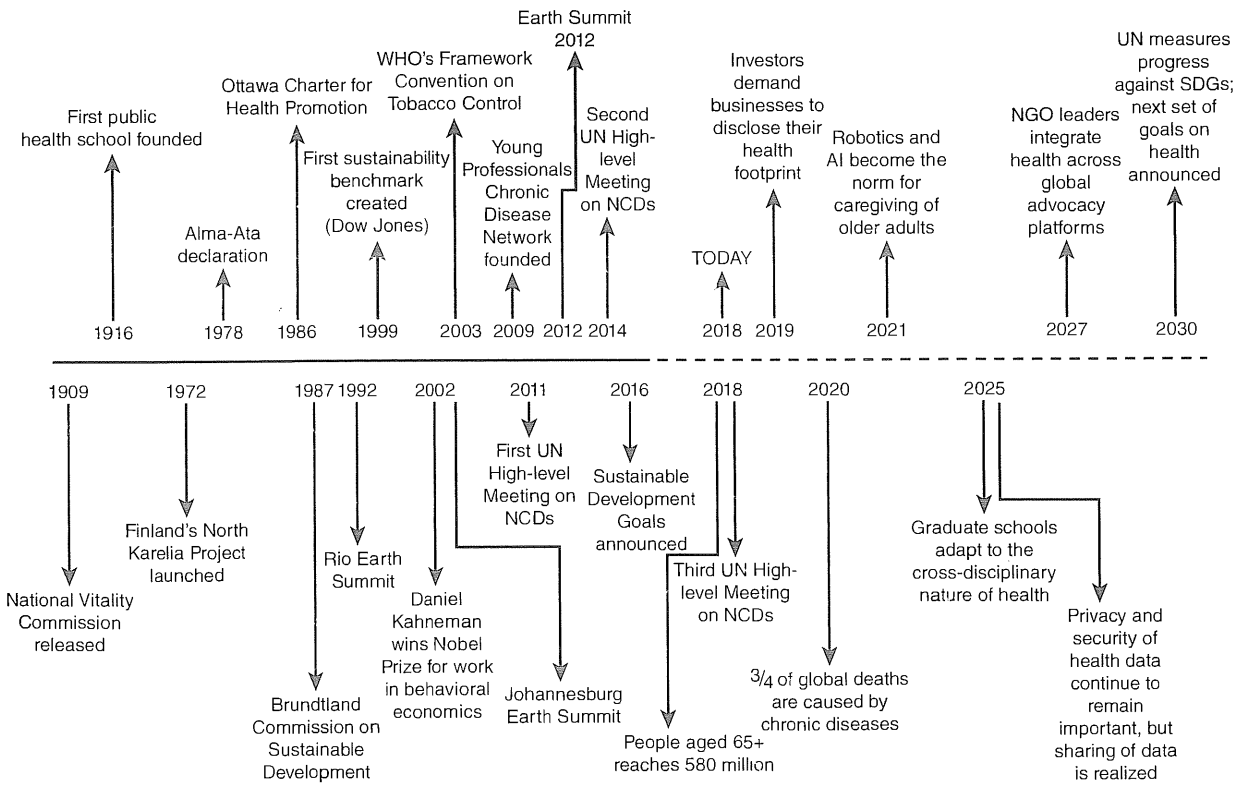


FIGURE 8-8 Milestones in chronic disease prevention, 1900–2030.

EXHIBIT 8-12 Future Roadmap for Health

To encourage interest in chronic diseases and to offer ideas on emerging trends, this list summarizes predictions about global trends related to health and well-being. It serves to inform actions to advance the Sustainable Development Goals (SDGs) and advocate for chronic disease prevention in coming decades.

- **Demographic changes:** Life expectancy now exceeds 70 years in many countries; rural workers are moving to cities to search for economic opportunities; and climate and political instability drives migration toward safer lands. These are intensifying pressures to develop healthy and vibrant communities.
- **Epidemiology structures:** Declines in undernutrition and maternal deaths have been complemented by rises in overweight/obesity and poor mental health. Infectious disease agents—most recently Ebola and Zika—will continue to threaten the resiliency of global populations. Strategies that encourage positive, individual behavioral change, and that prevent infectious disease outbreaks, will be critical to creating healthy populations and ensuring the sustainability of healthcare systems.
- **Health inequalities:** Health inequalities and inequities between different social groups are widening in many countries. Individuals' risk of poor health increases with declines in their socioeconomic position. Obesity rates, for example, are expected to rise in coming decades, especially among more disadvantaged groups.
- **Affordable health services:** Government austerity and rising healthcare costs threaten the sustainability of health systems. This has led to increased demand for affordable health services. Provisions for universal health coverage, investments into personalized treatments, and workplace health programs can reduce healthcare costs by governments and employers.
- **Digital technologies:** Rapid advances in technology are enabling individuals to quantify their health status, and can improve the well-being of disparate populations. These technologies empower individuals to better prevent, control, and treat disease, though associated privacy and security concerns must be proactively addressed to ensure their uptake among all populations.
- **Media and their consumers:** Media, including social media, serve to spark action and investment by documenting events with relevance to health, making consumers increasingly more vocal in their demands for creating healthier societies.

References

Abegunde, D. O., Shengelia, B., Luyten, A., Cameron, A., Celletti, F., Nishtar, S., & Mendis, S. (2007). Can non-physician health-care workers assess and manage cardiovascular risk in primary care? *Bulletin of the World Health Organization, 85*(6), 432–440.

Aboderin, I., Kalache, A., Ben-Shlomo, Y., Lynch, J. W., Yajnik, C. D., Kuh, D., & Yach, D. (2001). *Life course perspectives on coronary heart disease, stroke and diabetes: Key issues and implications for policy and research.* Geneva, Switzerland: World Health Organization.

Adams, J. L., Almond, M. L., Ringo, E. J., Shangali, W. H., & Sikkema, K. J. (2012). Feasibility of nurse-led antidepressant medication management of depression in an HIV clinic in Tanzania. *International Journal of Psychiatry in Medicine, 43*(2), 105–117.

Barr, V. J., Robinson, S., Marin-Link, B., Underhill, L., Dotts, A., Ravensdale, D., & Salivaras, S. (2003). The expanded Chronic Care Model: An integration of concepts and strategies from population health promotion and the Chronic Care Model. *Hospital Quarterly, 7*, 73–82.

Batty, G. D., & Leon, D. A. (2002). Socioeconomic position and coronary heart disease risk factors in children and young people. *European Journal of Public Health, 12*, 263–272.

Bell, A. C., Adair, A. S., & Popkin, B. M. (2004). Understanding the role of mediating risk factors and proxy effects in the association between socioeconomic status and untreated hypertension. *Social Science and Medicine, 59*, 275–283.

Black, R. E., Taylor, C. E., Arole, S., Bang, A., Bhutta, Z. A., Chowdhury, A. M. R., & Perry, H. B. (2017). Comprehensive review of the evidence regarding the effectiveness of community-based primary health care in improving maternal, neonatal and child health: 8. Summary and recommendations of the Expert Panel. *Journal of Global Health, 7*(1), 010908.

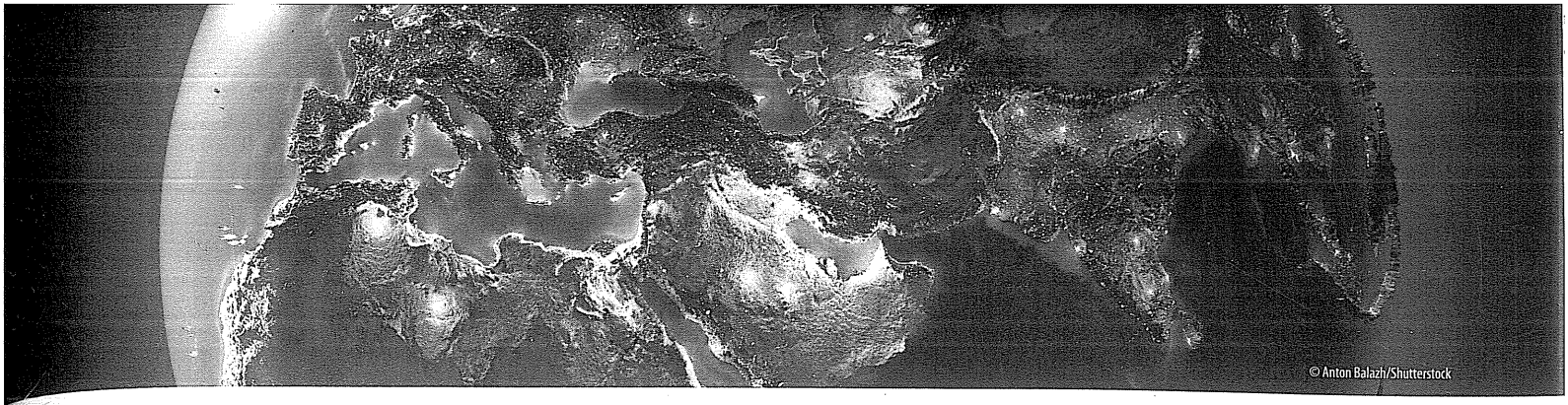
Bloom, D. E., Cafiero, E. T., Jané-Llopis, E., Abrahams-Gessel, S., Bloom, L. R., Fathima, S., . . . Weinstein, C. (2011). *The global economic burden of noncommunicable diseases.* Geneva, Switzerland: World Economic Forum.

Bodenheimer, T. S., & Smith, M. D. (2013). Primary care: Proposed solutions to the physician shortage without training more physicians. *Health Affairs (Millwood), 32*(11), 1881–1886.

Brands, A., & Yach, D. (2001). *Noncommunicable diseases and gender.* Geneva, Switzerland: World Health Organization.

Calitz, C., Pollack, K. M., Millard, C., & Yach, D. (2015). National Institutes of Health funding for behavioral interventions to prevent chronic diseases. *American Journal of Preventive Medicine, 48*(4), 462–471.

Callaghan, M., Ford, N., & Schneider, H. (2010). A systematic review of task-shifting for HIV treatment and care in Africa. *Human Resources for Health, 8*, 8.



CHAPTER 10

Global Mental Health

Vikram Patel, Alex Cohen, Brandon Kohrt, Harvey Whiteford, and Crick Lund

Introduction

In 2015, all nations united around a shared mission of achieving the Sustainable Development Goals (SDGs). This set of goals represented an exponential advance from the Millennium Development Goals (MDGs), which the SDGs replaced, both in its aspiration to encompass a substantially broader agenda and through its explicit recognition that these were global concerns, affecting all nations, and requiring global actions. One notable example of this transformative vision was the recognition that health burdens went beyond the MDG focus on a selection of infectious diseases and maternal and child health. Noncommunicable diseases, mental health, and substance abuse received recognition, and several targets related to these concerns were specified (**TABLE 10-1**). At last, it seemed that the decades of science and advocacy had finally allowed mental health to take its rightful place on the global development agenda.

The discipline of global mental health has played a key role in the inclusion of mental health in the SDGs. The field of global mental health was the product of decades of interdisciplinary research and practice in diverse transnational contexts. Governmental and nongovernmental organizations in the United Kingdom such as the Department for International Development (DFID) and the Wellcome Trust funded much of the early work in mental health research and services in low- and middle-income countries (LMICs) in the later part of the 20th century. A series of publications drawing upon this large body of evidence generated by epidemiologists, clinicians, social scientists, and human rights advocates led to a "call to action" in 2007 to "scale up services for people affected by mental disorders built on the twin foundations of cost-effective interventions and respect for human rights" in all countries of the world, and in particular in LMICs, where the attainment of these rights was most seriously compromised (*The Lancet* Global Mental Health Group, 2007).

For the purposes of this chapter, we consider the definition of "mental health" to include all conditions that affect the nervous system that are leading causes of disease burden. Conditions with a vascular or infectious etiology, such as human immunodeficiency virus (HIV) infection of the brain or cerebrovascular diseases, are excluded here, as they are addressed in other chapters of this text. Mental disorders include intellectual disability, epilepsy, anxiety and mood disorders, psychoses (schizophrenia and bipolar disorders), substance use disorders (alcohol and drug use disorders), and dementia. Thus, this list of health conditions includes disorders that clinicians may categorize as psychiatric, neurological, or substance use disorders. This chapter uses the acronym MNS disorders (meaning "mental, neurological, and substance use disorders"), which is common nomenclature for the World Health Organization (WHO) and other health and development institutions.

TABLE 10-1 Mental Health in the Sustainable Development Goals

	United Nations' Sustainable Development Goals
SDG 3	Ensure healthy lives and well-being for all at all ages
SDG Target 3.4	Requests that countries: "By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being"
SDG Target 3.5	Requests that countries: "Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol"
SDG Target 3.8	Requests that countries: "Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all"

Modified from United Nations Sustainable Development goals: http://www.un.org/sustainabledevelopment/sustainable-development-goals/

This rich interdisciplinary treasure of knowledge laid the foundation for the landmark 2007 *The Lancet* series on global mental health. The authors of this series of articles arrived at the conclusion that the high burden and unmet needs for care constituted a global health crisis. They deliberated on what might be the most urgent, clear, and specific "call to action" for the global health community and, in the end, chose to focus on the needs of those individuals affected by a mental disorder, calling for actions to reduce the treatment gap by scaling up the coverage of services for mental disorders in all countries, but especially in LMICs (*The Lancet* Global Mental Health Group, 2007). The years following the publication of *The Lancet* series witnessed a tangible increase in the attention to the treatment gap in LMICs, as evidenced by the increase in development assistance for mental health, which more than doubled in absolute dollars in the years immediately after 2007 (Gilbert, Patel, Farmer, & Lu, 2015). In 2011, the Grand Challenges in Global Mental Health initiative, led by the U.S. National Institute for Mental Health (NIMH), emphasized implementation research questions as the priorities to reduce the treatment gap for mental disorders (Collins et al., 2011) (**TABLE 10-2**).

The publication of these priorities led to a slew of new research initiatives by the NIMH to support research and training in global mental health as well as a set of international "hubs" for research on task sharing and scaling up mental health interventions, while Grand Challenges Canada supported dozens of projects addressing some of these priorities in a number of LMICs. Simultaneously, a number of global institutions and coalitions began to advocate for mental health. WHO launched its flagship mental health Gap Action Programme (mhGAP) to scale up care for MNS disorders in 2008 and developed a series of seminal publications that provide guidance to health practitioners in nonspecialist settings regarding treatments for MNS disorders (WHO, 2010); track the status of mental health systems at the country level (WHO, 2015); and establish standards of care for mental health facilities (see www.who.int/mental_health for a comprehensive listing of WHO resources for mental health). This culminated in the Comprehensive Mental Health Action Plan 2013–2020, which was agreed by all nations of the world in 2013, and the establishment of a roadmap for achievement of a broad range of mental health–related targets (Saxena, Funk, & Chisholm, 2013). The Disease Control Priorities Network published its recommendations, targeting governments and development agencies, for which interventions should be scaled up through diverse platforms from the community to specialist care, ultimately forming the mental and neurological health component of the package of interventions for universal health care (Patel et al., 2016). Notably, both the Comprehensive Mental Health Action Plan and the Disease Control Priorities Network recommendations took a much broader view of mental health, emphasizing the continuum from promotion of mental health to prevention of mental disorders, to treatment, long-term care, and inclusion of persons with mental disorders.

Preceding these developments were a number of reform initiatives in specific countries—for example, in Brazil and Italy—that sought to influence and promote a public health approach to mental health care. These efforts aimed to provide community-oriented

TABLE 10-2 Grand Challenges in Global Mental Health, 2011

Rank	Five Leading Challenges for Global Mental Health
1	Integrate core packages of mental health services into routine primary health care
2	Reduce the cost and improve the supply of effective psychotropic drugs for mental, neurological, and substance use disorders
3	Train health professionals in LMICs to provide evidence-based care for children with mental, neurological, and substance use disorders
4	Provide adequate community-based care and rehabilitation for people with chronic mental illness
5	Strengthen the mental health component in the training of all healthcare personnel to create an equitable distribution of mental health providers

Data from Collins, P. Y., Patel, V., Joestl, S., March, D., Insel, T. R., Daar, A. S. (2011). Grand challenges in global mental health. *Nature, 475*, 27–30.

care along with both medical and psychosocial interventions, while strongly emphasizing the priorities of those affected by mental disorders. The ultimate goal was to demonstrate that such approaches could improve access to quality care.

Reforms in Italy began in the 1960s, and reforms in Brazil can be traced to the 1990s, with the psychosocial community center program known as *Centros de Atenção Psicossocial* (CAPS) beginning approximately four to five years prior to the mhGAP initiative. Civil society partnership with mental health professionals to promote a shared vision continued to grow during the twenty-first century. The most notable example was the Movement for Global Mental Health (www.globalmentalhealth.org), which was launched in 2008 as a virtual global alliance. By 2015, the Movement included 170 member institutions representing diverse stakeholders, from academics to civil society representatives. Since 2013, the Movement has been led by persons affected by mental disorders. In several countries, prominent individuals have "come out" with their personal accounts of mental disorders, indicating the growing acceptance of this form of human suffering. The field of global mental health has become a respected discipline in its own right, complete with academic programs and centers in universities around the world, specialist journals and books on the subject, and an annual calendar of scientific events. Not surprisingly, the discipline has been described as having "come of age" (Patel & Prince, 2010).

This chapter is organized in three parts. First, it presents a brief history of global mental health prior to the *The Lancet* series. Next, it discusses four foundations of the discipline: the influence of culture and social determinants on mental health; the burden and impact of mental disorders (including substance use disorders and neurological disorders); effective prevention and treatment strategies; and the ways that these strategies can be delivered in low-resource contexts. Finally, it considers the limitations of the field as it is currently conceptualized and the strategies for addressing global mental health issues in the future.

Historical Development of Global Mental Health

The earliest developments of public mental health care can be traced at least as far back as the early Islamic world of the Middle East, North Africa, and Spain. Although accounts differ, it seems that the first hospitals that cared for persons with mental disorder were established by Islamic physicians during the ninth century CE in Baghdad and Egypt (Dols, 1987). Within a few hundred years, institutional care had spread 3,000 miles to the west in Marrakech (twelfth century) and Fez (thirteenth century), Morocco (Moussaoui & Glick, 2015). Influenced by the practices in Morocco, in the fourteenth century a hospital in Granada, Spain, began to accept persons with mental disorders. In the fifteenth and sixteenth centuries, hospitals for persons with mental disorders were established in at least five cities in Spain. In Northern Europe, there is evidence of the establishment of institutional care that coincides with or predates the founding of the hospitals in Spain (Mora, 2008; Pierloot, 1975). The most famous examples from Northern Europe are Bethlem

Hospital in London, which traces its establishment to the thirteenth century, and the Colony of Geel in Belgium, whose origins date from approximately the same time (Mora, 2008).

The beginning of modern public mental health can be traced to the late eighteenth century, when there was a decided shift in beliefs about the nature of mental disorder. Before this time, "madness" was associated with a loss of rationality, which meant that persons with mental disorders were considered as less than human and, in an effort to restore them to reason, were treated as brutes (Scull, 1989). "Moral treatment," which was developed simultaneously and independently in France (Weiner, 1992), England (Digby, 1985), and elsewhere (Scull, 2015), rejected the notion that mentally ill people lacked reason and suggested, instead, that tolerance and confinement in a well-ordered and pleasant environment could restore a person to rationality and mental health (Grob, 1994). The example of the York Retreat in England, which was established in the late eighteenth century as one of the sites in which moral treatment was developed, gave rise to "a wave of enthusiasm and optimism" for the curability of madness (Scull, 2015). This new perspective on mental disorders and their treatment brought about a powerful movement to abolish the abuses and to establish public systems of institutions that would offer beneficent care and the prospect of recovery to persons with mental disorders. One of the best examples of this advocacy was the work of Jean-Étienne Esquirol, who, after visiting a number of psychiatric institutions in France, wrote a report in 1819 in which he advocated for a state-run system of asylums (Goldstein, 2001). In 1838, France followed Esquirol's advice; other countries established similar systems in first half of the nineteenth century (Scull, 2015). The importance of this form of care for persons with mental disorders can be seen readily in the thousands of articles about asylums that were published in the nineteenth century in the leading English-language medical journals (Cohen & Minas, 2016).

As soon as the public asylums opened, they were filled beyond capacity. Throughout the second half of the nineteenth century, the notion of small curative institutions was abandoned due to increasing demands for services and a reluctance on the part of governments to allocate more funds for the care of mentally ill indigent persons (Grob, 1994; Scull, 1989). In addition, as conditions in the asylums grew worse, the effectiveness of asylum care—an assumption that had underpinned the widespread establishment of asylums—began to be questioned. These developments can be seen in publications in *The Lancet* over a period of 50 years. In 1827, the journal published a letter decrying the conditions in private asylums and called for "the establishment of public hospitals for insane paupers," and called to task the British Colleges of Physicians and Surgeons for not devoting more attention to these issues (Humanitas, 1827). Thirty years later, *The Lancet* (1857) published an editorial, "The Crime of Lunacy and How We Punish It," that questioned the efficacy of asylums: "They are . . . mere houses of detention." In 1875, the journal established the Commission on Lunatic Asylums to investigate "the treatment, in public and special institutions, of patients laboring under the various forms of mental disease" (*The Lancet*, 1875). The conclusions of the Commission were not positive: "It has been found impossible 'to formulate the system of treatment' either for cure or relief. Practically, there is no general 'system' beyond that which may be described as control" (*The Lancet*, 1877). Thus, by the late nineteenth century, public mental health efforts were inextricably associated with the wretched, overcrowded conditions in asylums: "the positive images of hospitals that had prevailed in the mid-nineteenth century [had given] way to far more negative ones associated with hopelessness, abuse, and ultimately death" (Grob, 1994).

Despite these concerns, the colonial enterprise saw the global expansion of institutional care for persons with mental disorders starting in 1567 when Spain established a psychiatric institution in Mexico City. The first institution of its kind in the Western Hemisphere, it heralded what later became known as colonial psychiatry. Nearly 200 years later, and continuing throughout the nineteenth century and into the first decades of the 20th century, "lunatic" asylums were established by British authorities in India (Basu, 2016; Weiss, 1983). Asylums were also established in French (Edington, 2013; Keller, 2008), Italian (Scarfone, 2016), Dutch (Pols, 2006), Spanish (Meyer, 2010), and other British (Ng & Chee, 2006; Sadowsky, 1997; Swartz, 1999) colonies. These institutions have often been depicted as being a form of racism and a means of exerting social control over indigenous populations (Goddard, 1992; Jackson, 1999; Schmidt, 1967; Swartz, 1999). However, it is also true that asylums in the colonies merely reflected the values and treatments in the home-country asylums of the colonial powers (Weiss, 1983).

Despite deteriorating conditions in asylums (rebranded as mental hospitals and psychiatric hospitals in the United Kingdom and the United States, respectively [Cohen & Minas, 2016]), the number of psychiatric inpatients continued to increase in the wealthy nations of the West. Then, beginning in the 1950s, efforts in North America, Western Europe, and Australia were initiated to remove long-term patients

from psychiatric facilities and provide treatment and care in the community. The incentive for what came to be called *deinstitutionalization* evolved from a convergence of several forces. First, encouraged by successful treatment of soldiers traumatized by their experiences in World War II, psychiatrists became optimistic about their ability to effectively treat mental disorders outside of hospital settings (Grob, 1994). Second, there was a growing awareness that the abusive conditions found in public psychiatric hospitals, as well as the negative effects on patients of long-term institutionalization, were at least as harmful as the chronic mental disorders themselves. Third, caring for patients in large institutions that did not provide effective care was expensive. Finally, the discovery in 1954 of chlorpromazine, the first effective antipsychotic medication, offered people with chronic mental disorders the prospect of living in the community rather than as inpatients (Greenblatt, 1992).

Together, these forces brought about dramatic changes in institutionalized populations. In the United States, for example, 559,900 people were in psychiatric hospitals in 1955; 25 years later, that number had decreased to 138,000 (Goldman, 1983). In Britain, the number of psychiatric inpatients peaked at 148,100 in 1954 and then steadily decreased; by 1985, there were only 64,800 such inpatients (Thornicroft & Bebbington, 1989). In Italy, deinstitutionalization took place somewhat later, but had similar results: Early in the 1970s there were about 75,000 psychiatric inpatients, but that number had dwindled to only 38,000 in 1981 (Morosini, Repetto, De Salvia, & Cecere, 1985).

Deinstitutionalization has had mixed reviews. Although large numbers of patients were discharged from hospitals, many came to be accommodated, at least in the United States, in prisons, nursing homes, and adult homes for mentally disabled persons (Scull, 1985), where the worst aspects of the old asylums were often recreated (Human Rights Watch, 2015; Levy, 2002a, 2002b, 2002c, 2002d). In Europe, some evidence suggests that "reinstitutionalization" has taken place. For example, as the number of psychiatric beds in hospitals has decreased, the number of persons with mental disorders in prisons and forensic hospitals has increased (Fakhoury & Priebe, 2007; Human Rights Watch, 2016; Priebe et al., 2005).

Although deinstitutionalization is considered a global policy (WHO & Gulbenkian Global Mental Health Platform, 2014), it has occurred primarily in Western countries, with a few exceptions. For example, the number of psychiatric hospital beds has increased in South Korea (Kim, 2017). Not only does Japan have the highest rate of psychiatric beds in the world (28.4 beds per 10,000 people), but it also has the longest average length of psychiatric hospitalization (Imai et al., 2005). Deinstitutionalization has not taken place at all in the great majority of LMICs, such that hospital-based care remains at the center of what exists of those countries' national mental health systems (Saxena, Thornicroft, Knapp, & Whiteford, 2007). A noteworthy exception is Brazil, which, between 1995 and 2005, reduced its number of psychiatric beds by 41% while increasing community services by a factor of 9 (Andreoli, Almeida-Filho, Martin, Mateus, & Mari, 2007). Other research suggests that while psychiatric beds decreased in six South American countries, including Brazil, prison populations have increased substantially (Mundt et al., 2015). It has been noted, however, that the increase in the prison population cannot be definitively attributed to deinstitutionalization (Winkler et al., 2016). More recently, other large middle-income countries have begun reforming their mental healthcare systems: India launched its first national mental health policy in 2014 with similar principles while China has greatly expanded coverage of care for mental disorders through its 686 Project, which refers to the first 6.86 million Renminbi (USD$ 829,000 in 2004) invested by the Chinese government to free patients from seclusion and restraints throughout the country (Ma, 2012; Patel et al., 2017).

Perhaps the best way to consider the positive and negative effects of deinstitutionalization is to ask the consumers of mental health services whose lives have been most affected by this policy. When that has been done, the answer is clear. Despite the difficulties of life outside the hospital, the relative lack of supportive services, and the effects of stigma and discrimination, former long-term inpatients generally agree they prefer living in the community (Davidson, Hoge, Godleski, Rakfeldt, & Griffith, 1996).

The development of community mental health services was both an impetus for and a product of deinstitutionalization. Although the potential for treating people with mental disorders outside of hospital settings was recognized prior to the discovery of effective antipsychotic medications, the evolution of community-based services came about with the recognition that treatment and care required a range of social and rehabilitation services and involved more than just dispensing medication. Thus, while the definition of community care may have once simply meant care outside hospitals, it now encompasses, at least ideally, professional services in community settings, social reintegration, and support services, such as housing, employment, medical care, and welfare (Tansella & Thornicroft, 2001). The provision of community services to individuals with mental

disorders is now a central principle of global mental health (Alem, 2002; Alem, Jacobsson, & Hanlon, 2008; Hanlon, Wondimagegn, & Alem, 2010; Semrau, Barley, Law, & Thornicroft, 2011; Thara & Padmavati, 2013; Thornicroft, Alem, Dos Santos, et al., 2010; Thornicroft, Tansella, & Law, 2008), though this remains an unfulfilled goal for the vast majority of persons affected by mental disorders globally.

The scientific and policy foundations of global mental health can be traced, at least in part, to activities at WHO that were begun soon after the establishment, in 1949, of a mental health division and an Expert Committee on Mental Health (Lovell, 2014). Two reports by the Expert Committee were of particular importance to the field that would become known as global mental health. The first of these reports, *Epidemiology of Mental Disorders* (WHO, 1960), sought to lay the groundwork for an international system for the classification of the psychiatric disorders and, more generally, to advance the ultimate goal of creating a scientifically rigorous approach to psychiatric epidemiology. Direct outcomes of this work included WHO's international studies of schizophrenia (Jablensky et al., 1992; WHO, 1973), as well as studies of schizophrenia in Mauritius (Murphy & Raman, 1971) and Sri Lanka (Waxler, 1979). In fact, there was a burgeoning of psychiatric research in developing countries during the 1960s (e.g., Lambo, 1960; Leighton et al., 1963; Lin, Rin, Yeh, Hsu, & Chu, 1969), 1970s (e.g., Harding, 1973; Jilek & Jilek-Aall, 1970; Kulhara & Wig, 1978), and 1980s (e.g., Harding et al., 1980; Kleinman, 1980; Kulhara & Chandiramani, 1988). The second of the Expert Committee's reports, *Organization of Mental Health Services in Developing Countries* (WHO, 1975), followed a *British Journal of Psychiatry* series on psychiatric problems in the developing world (Carstairs, 1973; German, 1972; Leon, 1972; Neki, 1973) and recommended many actions to address the burden of mental disorders in developing countries. One of the most farsighted statements in the report was the following: "A number of innovations have been recommended, notably the sharing of mental tasks by a wide range of health workers and by other community agencies."

WHO followed up these recommendations with a series of projects that attempted to integrate mental health services into primary care settings in seven low-income countries (Sartorius & Harding, 1983). Now, more than 40 years later, this strategy remains central to the development of mental health services in low-resourced settings.

As important as all of these projects were, perhaps the "founding" event of global mental health was the publication of the results of the first Global Burden of Disease (GBD) study, which introduced the concept of disability-adjusted life-years, a single measure that represented the burden imposed by both mortality and morbidity (the most recent findings of this initiative are described in more detail later in this chapter) (World Bank, 1993). Prior to this report, infectious diseases were prioritized by international public health efforts. However, the GBD study revealed that noncommunicable diseases—neuropsychiatric disorders, specifically—accounted for a significant proportion of the GBD. These findings provided the most compelling evidence that mental disorders were priority public health disorders in low-, middle-, and high-income countries alike. Thus, the GBD study opened the way to the field that became known as global mental health.

Culture and Mental Disorders

It is crucial to understand the role of culture in the experience, diagnosis, and treatment of mental disorder (Kirmayer & Swartz, 2014). Common elements in the definition of culture are "values, beliefs, knowledge, norms, and practices and the notion that that these are shared among a specific set of people" (Hruschka & Hadley, 2008, p. 947). Beliefs refer to conscious psychological processes. Norms are behaviors maintained by social sanctioning and affective responses. Values are valences placed on beliefs, knowledge, and norms that lead to engagement in or avoidance of behaviors. These beliefs, norms, and values shape both lay and professional understandings of mental disorder. This section addresses the following topics: (1) the role of culture in biomedical classification systems; (2) alternative approaches to mental disorder categorization across diverse cultural contexts; and (3) cross-cultural methods and approaches to improve mental health research and services.

Cultural Considerations for Biomedical Psychiatric Classification

Understanding the origins and assumptions of different diagnostic systems is vital to implement best practices in research and clinical care for diverse global populations. The classification of diseases leads, in theory, to more accurate diagnoses and effective treatments. Valid and reliable systems of classification make it possible to determine accurate prevalence and incidence rates and, therefore, should guide decisions about the development of services. The classification of mental disorders, however, presents some unique

challenges. Psychiatric diagnoses do not "carve nature at the joint" and the boundaries between different conditions may not be distinct (Blacker & Tsuang, 1992; Kendler & Gardner, 1998; Tsuang, Stone, & Faraone, 2000). Unlike other diseases, there are no specific and replicable pathophysiological pathways to distinguish most mental disorders in a clinical setting. Moreover, clinical classification in psychiatry is based on the symptom profiles, rather than on the disorders' etiology (as in the case of infectious diseases) or their pathology (as in the case of vascular disease).

Two main biomedical systems of psychiatric classification are used today: the *International Classification of Diseases* [ICD] (WHO, 1990) and the *Diagnostic and Statistical Manual of Mental Disorders* [*DSM*] (American Psychiatric Association [APA], 2013). These approaches to psychiatric categorization took shape in the late 1800s with the work of Emile Kraepelin and others who developed diagnoses based on standardized factors related to symptom presentation, prognosis, and hereditary risks (Jilek, 1995). Kraepelin and his followers also influenced modern frameworks regarding the incorporation of culture into psychiatric classification. Kraepelin traveled to Java, Sri Lanka, India, Singapore, and the Americas to evaluate his diagnostic criteria with non-European populations. He and his followers developed a model with a biological core for mental disorders (i.e., pathogenic), with cultural influences shaping the presentation of that biological core (i.e., pathoplastic) (Jilek, 1995). For example, hallucinations were considered a universal biologically-determined feature of psychosis whereas culture shaped the content of those hallucinations. Most current classifications (e.g., DSM and ICD) continue this approach with cultural considerations for different conditions while assuming conditions are grounded in a core of presumed universal psychiatric pathology.

These classification systems—DSM and ICD—and their assumption of biological universality are often considered *etic* perspectives in cross-cultural psychiatry. "Etic" refers to a universal classification systems and is contrasted with "emic," which refers to classifications specific to a culture, which may or may not overlap with etic categorizations (Hahn, 1995). The use of the DSM and ICD psychiatric categorizations as overarching etic frameworks applicable across all cultures has been critiqued by some psychiatrists and social scientists (Kleinman, 1988; Kleinman & Good, 1985; Littlewood, 2002). The DSM and ICD do not incorporate all emic divisions from other cultures and medical nosologies, such as Chinese, Ayurvedic, or Q'uranic classifications of mental disorder. It is argued that classifications of psychiatric disorders largely reflect American and European emic concepts of psychopathology based on implicit cultural concepts of normality and deviance. In addition, the classification systems have not been comparably applied across racial/ethnic groups within the same clinical context. For example, in the United Kingdom and United States, African- and Caribbean-descent populations are more likely to be diagnosed with schizophrenia compared with white/Western European-descent populations with the same symptom profile; the latter are diagnosed with bipolar disorder more frequently than with schizophrenia (Bell, Williamson, & Chien, 2008; Louden, 1995). For a challenge to these claims, see the work of Selten and Hoek (2008) and Singh, Greenwood, White, and Churchill (2007).

Even when comparable symptoms are observed, the social and personal significance of the behavior or experience may not have the same meaning and their explanatory models may differ. Researchers have cautioned that there is a risk of confounding culturally distinctive behavior with psychopathology on the basis of superficial similarities of behavior patterns or phenomena, an assumption referred to as a "category fallacy" (Kleinman, 1987). Within European and North American cultural contexts, there also have been debates about the scope of depression and how it is—or is not—distinguished from normal grief (Wakefield & Demazeux, 2015).

Due to these shortcomings, cross-cultural studies in psychiatric epidemiology historically have suffered from several problems. For example, case identification techniques varied from site to site, and methods were not standardized (Gorenstein, 1992). These inconsistencies led to a movement to standardize the process of psychiatric measurement and diagnosis so that diagnoses would be more replicable among clinicians and across patient populations. In the United States, one expectation since the third edition of the DSM (APA, 1980) was that this kind of standardization would help to reduce bias and increase the reliability of diagnoses across populations and among clinicians. Similarly, the tenth revision of the ICD (ICD-10) was developed with the explicit purpose of being an international standard (WHO, 1990). Thus, efforts were made to ensure that the drafters of the ICD-10 were drawn from as many countries as was feasible, and the revised system of classification was field-tested by more than 700 clinicians in 39 countries from all continents. The vast majority of ICD-10 conditions have reasonable reliability (Sartorius et al., 1993).

In preparation for the ICD-11, which was due to be published in 2018, one approach to explore cultural bias has been to evaluate how clinicians across cultures categorize disorders based on their clinical experiences. In a study of 517 clinicians in eight countries ranging from Brazil to India to Japan, clinicians had strong inter-rater agreement regardless of their national or cultural origin (Reed et al., 2013). The same study found that the cross-cultural categorizations were generally consistent with DSM and ICD, but the clinician-generated categories were more consistent with the proposed changes for ICD-11 compared to the DSM-IV or ICD-10, in particular with regard to personality disorders.

Critiques of cultural biases in diagnoses are part of a broader movement in psychology that has detected biases when the vast majority of research is based on a single population demographic. This problem has been referred to as the bias of psychology research being dominated by WEIRD populations (Western, Educated, Industrialized, Rich, and Democratic), which account for 90% of psychology publications (Henrich, Heine, & Norenzayan, 2010b). When psychological studies have been conducted with non-WEIRD populations, researchers have discovered that presumed universal processes such as visual perception, spatial reasoning, and behavioral motivation related to fairness and cooperation have cultural variations. In addition, it is important to consider that diagnostic criteria of syndromes can and do change over time, as is well demonstrated by the regular revisions of international psychiatric classifications, and that these changes are considerably influenced by attitudinal, political, and historical factors. Anthropologists have investigated how diagnoses are developed out of specific social, economic, and political environments; for example, there are in-depth historical accounts with anthropological critiques of disorders including posttraumatic stress disorder (PTSD) (Young, 1995), bipolar disorder (Martin, 2007), and dissociative disorders (Hacking, 1998).

Fifty years of research suggests that concepts of psychosis are remarkably similar across diverse settings (Cohen et al., 2016). Cross-cultural reviews of depression, PTSD, and other conditions have found that some symptoms may vary across cultures, though they have also found many universals. In a systematic review covering 178 social groups (varied by location, ethnicity, culture, and/or geography), of which 115 were non-Western populations, DSM hallmark symptoms of depressed mood/sadness, fatigue/loss of energy, problems with sleep, appetite/weight problems, and suicidal thoughts were common across all groups (Haroz et al., 2017). At the same time, the review revealed that some symptoms with near universality are not captured in current biomedical classifications. For example, symptoms such as social isolation/loneliness, crying a lot, somatic complaints, and thinking too much were among the most common symptoms but are not included in DSM criteria. Even among Western populations, the symptoms of social isolation and crying a lot were among the top 10 most associated with depression. In contrast, DSM diagnostic symptoms such as psychomotor agitation/retardation, feelings of worthlessness/guilt, and poor concentration were not among the top 10 associated symptoms in Western and non-Western cultural groups.

A cross-cultural review of PTSD concluded that while this diagnosis is generally "valid"—that is, it reflects the reality of human experience across populations—there is considerable cultural variability (Hinton & Lewis-Fernandez, 2011). The PTSD review highlighted cultural differences in the meaning and interpretation of trauma symptoms, the prevalence of the diagnosis across groups, the prevalence of specific symptoms such as those related to avoidance and numbing, the likelihood that a person of one culture will develop PTSD compared to a person of another culture given the same trauma exposure, and the association with nontraumatic stressors.

These types of cross-cultural systematic reviews are helpful to identify potential cultural biases in psychiatric diagnoses and to point us toward approaches that may be more appropriate across populations.

Alternative Approaches to Categorize and Conceptualize Mental Disorders

Historically, classifications of mental disorders prior to the DSM and ICD have existed in different cultures. All cultures have some form of distinguishing normal from abnormal, or socially acceptable versus unacceptable behavior, and this is often the province of religious practitioners and traditional healers (Clifford, 1990; El-Islam, 1982; Kleinman, 1980; Kohrt, Hruschka, Kohrt, Panebianco, & Tsagaankhuu, 2004; Weiss et al., 1988).

As an example, the first Chinese Classification of Mental Disorders (CCMD) appeared in 1979; since then, the system has undergone several revisions. Its third and most recent version is heavily influenced by the ICD-10 and DSM-IV systems, but still retains local features. The main differences between the ICD-10 and the CCMD-3 are the CCMD-3's retention of the term "neurosis" and categories of neurotic disorders such as neurasthenia (Lee, 2001). Personality disorders are

less often diagnosed in Chinese populations; thus, two categories of personality disorders—borderline personality disorder and avoidant personality disorder—are excluded from the Chinese scheme. The CCMD also includes its own section of culture-related mental disorders such as *qigong*-induced mental disorder. *Qigong* is a trance-based form of a traditional Chinese healing system. The disorder is similar to a dissociative state, featuring identity disturbance, irritability, hallucinations, and aggressive and bizarre behaviors. These often acute, brief episodes are linked to excessive practice of *qigong* meditation by physically or psychologically ill subjects.

Emic conditions (i.e., locally relevant categorizations) that are not typically observed in Western culture have been referred to as culture-bound syndromes (Simons & Hughes, 1985). Examples include *latah* (a startle-based form of distress in Southeast Asia), *koro* (a fear of genital retraction also noted in Southeast Asia), and *ode ori* (a West African form of distress characterized by thinking too much and attributed to a worm crawling in the skull) (Makanjuola, 1987; Simons & Hughes, 1985). Over time, the "bounded" aspect of culture-bound syndromes has been challenged due to findings of similar patterns of distress in disparate cultural settings, a lack of cohesive symptom presentation characterizing a syndrome, and the diversity in etiological attributions and vulnerable groups (Hahn, 1995; Kirmayer & Minas, 2000). Dissatisfaction with the term "culture-bound syndrome" has led researchers to propose other labels, such as "idiom of distress," "popular category of distress," "cultural syndrome," and "explanatory model" (Nichter, 1981; Weiss, 1997). In DSM-5, the term "cultural concept of distress" (CCD) attempts to aggregate these concepts without implying cultural exclusivity: "*Cultural concept of distress* refers to ways that cultural groups experience, understand, and communicate suffering, behavioral problems, or troubling thoughts and emotions" (APA, 2013, p. 758).

There is now a large literature indicating commonalities in emic categories of psychological distress. A systematic review (Kaiser et al., 2015) identified 138 publications mentioning "thinking too much," with examples from every populated continent including terms such as *kufungisisa* (Zimbabwe), *reflechi twòp* (Haiti), *pensando mucho* (Nicaragua), and *kut careen* (Cambodia), and, in more recent studies, *ucingakakhulu* (South Africa) (Davies, Schneider, Nyatsanza, & Lund, 2016). Across cultures, "thinking too much" is characterized by ruminative, intrusive, and anxious thoughts that, if prolonged, result in a range of physical and psychological complaints. Common associated symptoms include low mood, anhedonia, poor concentration, social withdrawal, sleep disruptions, and somatic complaints across most populations. "Thinking too much" is associated with similar socioeconomic and traumatic stressors across populations. Moreover, coping mechanisms share commonalities across cultures, such as controlling or suppressing thoughts, distraction, and engaging in social activities—all of which overlap with evidence-based psychological treatments. This study is one of the few examples of how starting with a CCD rather than with a psychiatric category can help generate information on commonalities in psychological distress across populations.

A systematic review of CCDs and their overlap with DSM and ICD psychiatric categories demonstrates that the presence of a CCD increases the likelihood of persons meeting criteria for a psychiatric disorder (Kohrt et al., 2014). However, there is not a one-to-one match; that is, no CCD predicts a psychiatric diagnosis in 100% of individuals. On average, presence of a CCD does strongly predict PTSD, and to a lesser degree CCDs are predictive of depression and general psychological distress (**FIGURE 10-1**). Despite somatic complaints (i.e., physical symptoms such as headaches, digestive problems, and numbness and tingling) frequently being an aspect of CCDs, most CCDs are more strongly associated with common mental disorders than with somatoform disorders. Guidance for conducting rigorous epidemiologic studies of CCDs is now available with the tool known as Systematic Assessment of Quality in Observational Research for Cultural Psychiatry Epidemiology (SAQOR-CPE; Kohrt et al., 2014).

Cultural concepts of distress are increasingly recognized as an important component of culturally adapting mental health treatments, especially psychological treatments. Studies with the strongest effect sizes (i.e., those with the biggest improvements in mental health from pre- to post-treatment) do not utilize psychiatric categories when framing distress for patients and clients. For example, in India, depression and common mental disorders (CMDs) are often framed as "stress" or "tension" (Patel et al., 2010; Petersen et al., 2016), which are cultural idioms of distress that have many features of CMDs but are nonstigmatizing and facilitate treatment engagement (Weaver, 2017). In Zimbabwe, a lay health worker–delivered psychological treatment, "The Friendship Bench," uses the CCD *kufungisisa* (Shona for "thinking too much"; Patel, Simunyu, & Gwanzura, 1995) as a culturally acceptable way to discuss CMDs (Chibanda et al., 2016). Similarly, treatment of refugees and immigrants with culturally adapted cognitive-behavioral therapy has framed the interventions with CCDs (e.g., *nervios*-related conditions for

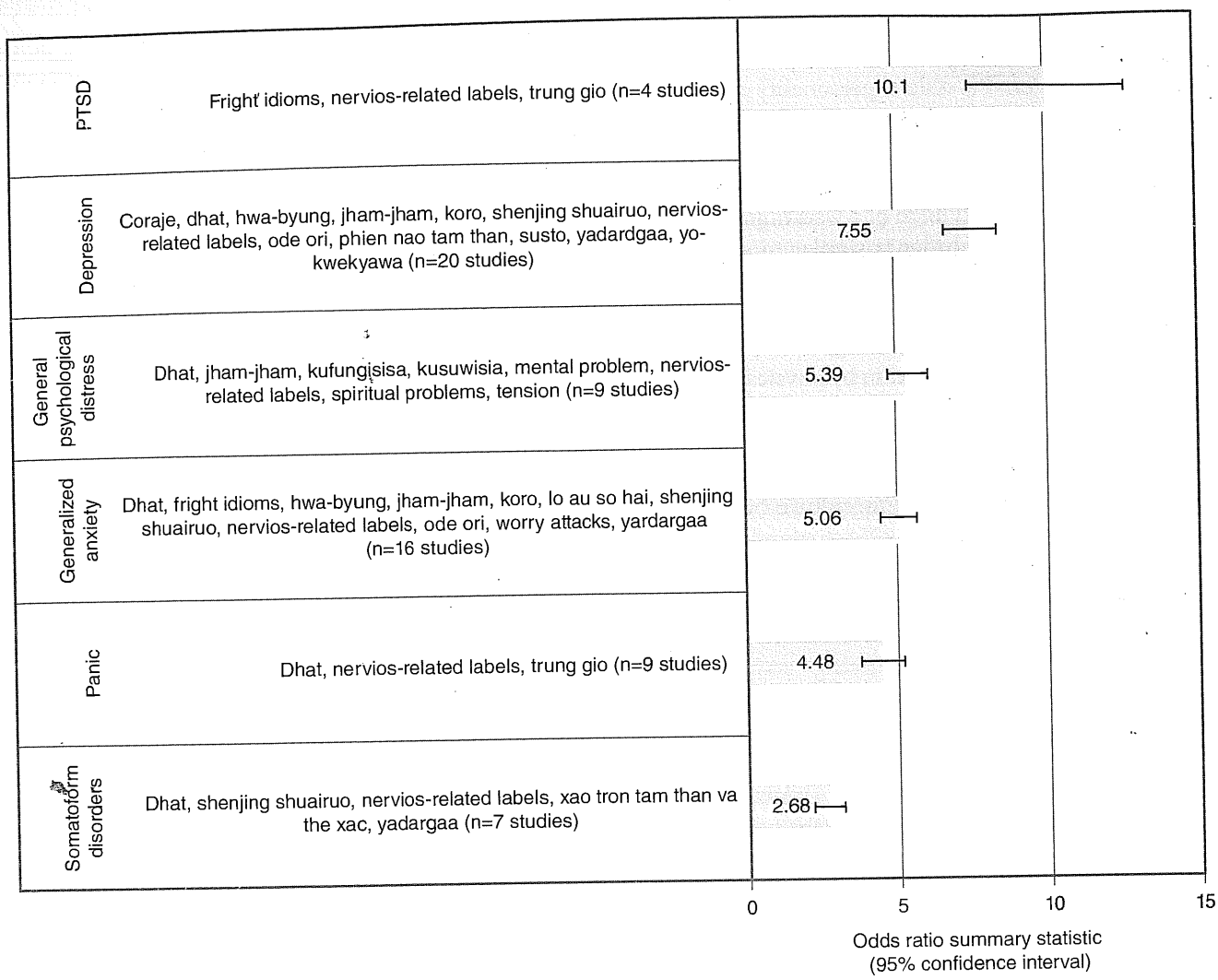


FIGURE 10-1 Psychiatric disorders and cultural concepts of distress.

Modified from Kohrt, B. A., Rasmussen, A., Kaiser, B. N., Haroz, E. E., Maharjan, S. M., Mutamba, B. B., de Jong, J. T., & Hinton, D. E. (2014). Cultural concepts of distress and psychiatric disorders: literature review and research recommendations for global mental health epidemiology. *International Journal of Epidemiology* 43(2): 365–406.

Latinos and *khyaal attacks* for Cambodians), and studies have shown significant improvements in both the CCDs and in reduction of depression and PTSD (Hinton, Hofmann, Pollack, & Otto, 2009; Hinton, Rivera, Hofmann, Barlow, & Otto, 2012).

Within high-resource settings in European and North American cultures, there are also concerns about the generalizability and conceptual assumptions in psychiatric nosologies such as the DSM. In the United States, NIMH has proposed the Research Domain Criteria (RDoC) as a way to look at processes from genes to functional neuroscience to environment in an effort to understand etiology and presentation and ultimately guide treatment (Insel et al., 2010). This more dimensional system provides an alternative to the categorical divisions between "mentally ill" and "normal," which have been contested by cross-cultural researchers (Bilder, 2015). Moreover, this approach can incorporate social genomics and social neuroscience methods that are increasingly demonstrating that culture and biology interact (Cole, 2014; Rule, Freeman, & Ambady, 2013). Individual and collective experiences including acculturation, especially during child development, determine much of the biological and psychological processes observed in adulthood.

Ultimately, much of RDoC focuses on the individual level. Nevertheless, there are increasing calls for an analogous approach to societal-level causal mechanisms that would be useful from a public and global mental health perspective (Stein, Lund, & Nesse, 2013). Going forward, there is potential for social neuroscience and cross-cultural psychiatry to find areas of convergence to develop more accurate diagnostic approaches to apply across diverse populations (Kirmayer & Gold, 2012b).

Cross-Cultural Methods and Approaches for Mental Health Research and Services

Ultimately, diagnostic categories are a moving target, as they are continually being transformed by improved biocultural research that seeks to better understand mechanisms and improve the fit between types of interventions and persons with psychological distress. As diagnoses continue to change, it is crucial to have a set of rigorous methodologies that can integrate culture into global mental health research and interventions. Examples of these rigorous methods are transcultural translation and validation procedures for assessment and the Cultural Formation Interview for clinical care.

Cultural equivalence is needed for psychiatric assessment tools used for research, screening, and treatment monitoring. Lack of cultural equivalence risks category fallacies and under-, over-, and misdiagnosis. A tool is considered to have cultural equivalence (i.e., measurement invariance) if it measures the same construct across cultures. Content, semantic, technical, criterion, and conceptual equivalence are needed to achieve measurement invariance (Flaherty et al., 1988). These are defined as follows:

- *Content equivalence:* Does the phenomenon in question occur and is it locally recognized as distressing within the target culture?
- *Semantic equivalence:* Does the meaning of each item remain the same after translation?
- *Technical equivalence:* How does the method used in data collection affect results differentially between cultures? Technical methods could encompass response options on scales, item structure, and administration format (e.g., pen and paper, computerized assessment, interview administered). Challenges have been identified with the use of Likert scales, statements versus questions, positive versus negative wording, and pictorial response scales (Kohrt et al., 2011; Weobong et al., 2009).
- *Criterion equivalence:* What is an instrument's relationship with previously established and independent criteria for the same phenomenon? According to criterion equivalence, there should be comparable psychometrics (e.g., sensitivity, specificity, positive predictive value, negative predictive value) with a known marker, oftentimes a structured clinical interview.

There are now best practices for transcultural translation and validation that incorporate qualitative methods followed by a clinical validation study to establish psychometric properties, which have been used for both adult and child populations (Kohrt et al., 2011; Van Ommeren et al., 1999). This transcultural translation approach involves qualitative interviews including focus group discussions with target groups and cognitive interviewing, accompanied by a series of translations and back-translations, followed by a clinical validation study.

Regarding clinical services in global mental health, the cultural formulation interview (CFI; **EXHIBIT 10-1**) in DSM-5 is a new tool that can be applied to any patient or population and assures that cultural factors are integrated in diagnosis, treatment planning, and delivering care (APA, 2013). The CFI was developed to assess five components: (1) cultural identity of the individual, (2) cultural explanations for an illness, (3) cultural factors contributing to psychosocial environment and functioning, and (4) cultural factors influencing the clinician–patient/client relationship. Value must be placed on both folk beliefs about mental disorder and the biomedical system of psychiatry. It is important to investigate patients' "explanatory models"—that is, how patients understand their problems, including their nature, origins, consequences, and remedies, as these

EXHIBIT 10-1 Cultural Formulation Interview in DSM-5

This CFI is a tool for clinicians and treatment teams to improve mental health services by assuring that cultural factors are integrated into diagnoses, treatment planning, and delivery of care. The CFI includes four components:

- Cultural definition of the problem: Explanatory models including prominent idioms of distress, reasons for treatment seeking, and impact on functioning.
- Cultural perceptions of the cause, context, and support: Cultural models of causation, impact on and influence of one's social network, culturally relevant interpretations of social stressors, and cultural identity of the individual.
- Cultural factors affecting self-coping and past help-seeking: Self-coping, past help seeking, and prior barriers to care and recovery.
- Cultural factors affecting current help seeking: Patient preferences related to social networks and religion, and clinician–patient relationship factors. The provider must identify differences and similarities in cultural and social status that might influence diagnosis and treatment.

Modified from American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders: DSM-5. Washington, DC. American Psychiatric Publishers, Incorporated.

aspects of understanding can radically alter patient–provider negotiations over appropriate treatment (Kleinman, 1988). The CFI can be used at individual, family, and community levels to inform clinical services and public health efforts in global mental health.

Ultimately, findings across diverse disciplinary approaches increasingly point toward commonalities for understanding mental disorder across cultural groups. As noted earlier, common manifestations and pathways for healing have been identified. Moreover, studies that have shown differences across groups have often shed light on the limitations of psychiatric practices that need to be changed to improve care in high-resource, Western cultural settings as well as in LMIC contexts. This point not only highlights the importance of cross-cultural work for global mental health in low-resource, non-Western settings, but also suggests how global mental health research can better inform mental health categorizations in high-resource, high-researched settings.

The Determinants of Mental Disorders

The etiology of mental disorders comprises a complex interplay among biological factors, most notably genetic predisposition, developmental factors, and psychosocial factors. Until the 1950s, the dominant notions about the etiology of mental disorders were hereditary and environmental in nature. For example, schizophrenia was attributed to abnormal parenting, and obsessive–compulsive disorder to "anal aggression." Beginning in the 1960s, however, a more balanced view emerged. Consensus was reached that both environmental and genetic influences contribute to the development of mental disorders. Psychotic conditions, which historically have been thought to arise predominantly from biological risk factors, have increasingly been shown to be strongly influenced by social determinants (Kirkbride et al., 2006; McGrath et al., 2004). The observation that many disorders have their onset in childhood and youth have placed focus on the developmental origins of these disorders (e.g., related to brain development during childhood and adolescence).

Although risk factors for the majority of mental disorders present themselves in childhood and adolescence, the major burden of mental disorders is found in early adulthood (Murray et al., 2012). Indeed, a range of childhood adversities, such as neglect and parental mental illness, are strongly associated with numerous mental disorders in later life, presumably due to the impact of "toxic stress" on the developing brain. These factors can be divided into risk factors and protective factors. Risk factors make it more likely that an individual will develop mental health difficulties, whereas protective factors mediate and reduce the effects of risk exposure. Risk and protective factors can exist in the biological, psychological, and social domains (**TABLE 10-3**). Many risk factors for mental disorder also predispose persons to a host of physical health and social problems. Adverse childhood experiences (ACEs), such as child abuse and domestic violence, loss of caregivers, nutritional deprivation, and severe childhood illness, are exposures that increase the risk of physical diseases (e.g., cardiovascular and metabolic disease), mental disorders (e.g., suicide, substance abuse, and common mental disorders), and early mortality (Anda et al., 2006; Van Niel, Pachter, Wade, Felitti, & Stein, 2014).

The question was therefore changed from *which* factors were relevant for a specific disorder, to *how much* each contributed to the condition. Ultimately, this question, too, proved to be based on an incorrect assumption—namely, that the environmental, developmental, and genetic factors exert their influences in an additive and independent manner. There is now recognition that they exert their influences in an interactive manner, which develops over the life course. Contemporary scientists are attempting to address the question of *how* they interact.

The Social Determinants of Mental Disorders

The social determinants of mental disorders may be organized into five broad domains (Lund, De Silva, & Stansfeld, 2014):

- The economic domain, which includes poverty, income, consumption, assets, income inequality, and employment
- The social domain, which includes social capital, social cohesion, and education
- The demographic domain, which includes age, gender, and ethnicity
- The neighborhood domain, which includes the area-level social and economic arrangement of people's lives such as housing, water and sanitation, and transport
- The environmental events domain, which includes natural disasters, such as floods, earthquakes, and climate change, as well as civil conflict and forced migration

Each of these domains exerts its influence on population mental health by means of both distal factors

TABLE 10-3 Selected Risk and Protective Factors for Mental Health

Domain	Risk Factors	Protective Factors
Biological	▪ Exposure to toxins (e.g., tobacco and alcohol) during pregnancy ▪ Genetic tendency to psychiatric disorder ▪ Head trauma ▪ HIV/AIDS and other physical illnesses	▪ Age-appropriate physical development ▪ Good physical health ▪ Services provided at mother–baby clinics
Psychological	▪ Maladaptive personality traits ▪ Effects of emotional, physical and sexual abuse, and neglect	▪ Ability to learn from experiences ▪ Good self-esteem ▪ High level of problem-solving ability ▪ Social skills
Social		
Family	▪ Divorce ▪ Family conflict ▪ Poor family discipline ▪ Poor family management ▪ No family	▪ Family attachment ▪ Opportunities for positive involvement in family ▪ Rewards for involvement in family
School or workplace	▪ Failure to perform at the expected level ▪ Low degree of commitment to school or workplace ▪ Inadequate/inappropriate educational provision or training opportunities ▪ Experiences of bullying and victimization	▪ Opportunities for involvement in school or occupational activities ▪ Supportive, stimulating school environment that is tailored to children's developmental needs
Community	▪ Community disorganization ▪ Effects of discrimination ▪ Exposure to violence ▪ Social conflict and migration ▪ Poverty ▪ Transitions (e.g., urbanization)	▪ Connectedness to community ▪ Opportunities for constructive use of leisure ▪ Positive cultural experiences ▪ Positive role models ▪ Rewards for community involvement

Modified from World Health Organization (WHO). (2015). *Child and adolescent mental health policies and plans*. Retrieved from http://www.who.int/mental_health/policy/Childado_mh_module.pdf

("upstream" social and structural factors, such as social policy, macro-economic trends, and environmental disasters) and proximal factors (the manner in which these distal factors are experienced by individuals and their families, such as employment, housing quality, and trauma).

Environmental Events Domain

According to the United Nations High Commissioner for Refugees (http://www.unhcr.org/4981c3dc2.html), as of 2007 an estimated 11.4 million refugees had fled their own countries, another 13.7 million were internally displaced, and 2.9 million were not considered citizens of any state. Many of these refugees have experienced enormous trauma in the form of violence, crime, or other humiliations; physical injury; economic dispossession; and disruption of family and community structures. Thus, the rates of mental disorders among these people would be expected to be at least as high as—and probably higher than—those for migrants in general. A study of more than 3,000 respondents

from postconflict communities in Algeria, Cambodia, Ethiopia, and Palestine found that PTSD was the most likely MNS disorder in individuals exposed to violence associated with armed conflict (de Jong, Komproe, & Ommeren, 2003). Other mental health consequences included mood and anxiety disorders.

In addition to exposure to trauma, a number of other factors may predispose refugees and immigrants to mental disorders, such as marginalization and minority status, socioeconomic disadvantage, poor physical health, the loss of social support systems, and cultural alienation in the new society. For illegal immigrants, there is also the constant fear of being found out and deported; as a consequence, access to possible sources of help is severely limited. In discussing these issues, it is relevant to note that the universal application of the concept of trauma-related mental disorders (in particular, PTSD) has been criticized because it is itself based on culturally influenced notions of how a person is supposed to react to trauma (see the earlier discussion on culture and mental disorders). While consensus exists that trauma does negatively affect a person's mental health, the question of whether this negative impact should be conceptualized in psychiatric terms (with the concomitant implications of diagnosis and treatment) or in social and cultural terms remains unresolved.

Economic Domain

There is now a substantial body of evidence demonstrating the relationship between poverty and socioeconomic inequalities with mental disorders. In the United Kingdom, for example, evidence has pointed to an association between a low standard of living and the prevalence of depression (Weich & Lewis, 1998). A systematic review located 115 studies in which the associations between poverty and anxiety and mood disorders in 36 LMICs were examined (Lund et al., 2010). Most of these studies reported positive associations between a range of poverty indicators and anxiety and mood disorders. Multivariate analyses showed that in community-based studies, 79%, 15%, and 6% reported positive, null, and negative associations, respectively. A robust association was found between anxiety and mood disorders and education, food insecurity, housing, social class, socioeconomic status, and financial stress. By comparison, the associations between anxiety and mood disorders and income, employment, and consumption were relatively inconsistent. People living in conditions of poverty are also at greater risk for physical health problems, and abundant evidence demonstrates the high degree of comorbidity between physical and mental disorders (Prince et al., 2007). Studies in developed countries have shown that mortality and morbidity rates are more affected by relative, rather than absolute, living standards. A survey in the United States, for example, showed an independent association between low income and living in income-unequal states with depression in women (Kahn, Wise, Kennedy, & Kawachi, 2000). This finding suggests that it is not just having low income, but having low income in relation to others, that increases risk for depression.

Social Domain

The association between poverty and poor mental health may be mediated both by individual psychological factors, such as low self-esteem and frustration, and by a breakdown in structural factors in the community, such as less social cohesion and poorer infrastructure. Reduced prevalence of common mental disorders has been found in populations with higher individual cognitive and ecological social capital (Ehsan & De Silva, 2015). The lack of social support and the breakdown of kinship structures may be important stressors for the millions of migrant laborers in the urban centers of Asia, Africa, and South America, as well as for the millions of dependents who are left behind in rural areas and whose primary source of income consists of the remittances that their relatives send from distant cities. In high-income countries, increased mobility of labor has reduced family ties and also led to the decline of the extended family.

The social consequences of low educational levels are obvious, especially in LMICs that are facing a growing lack of security for employees as those countries' economies are reformed. Lack of secondary education may produce a diminished opportunity for persons who are depressed—especially women—to access resources to improve their situation (Patel, Araya, de Lima, Ludermir, & Todd, 1999). Education also plays an important protective role: A consistent finding across countries is that higher educational levels are associated with reduced prevalence of common mental disorders (Lund et al., 2010), and in the long term education is protective in reducing subsequent late-life depression (Chang-Quan, Zheng-Rong, Yong-Hong, Yi-Zhou, & Qing-Xiu, 2010).

Demographic Domain

Gender is a major determinant of mental health. As described later, the excess prevalence of depression for women has been demonstrated in most community-based studies in all regions of the world.

Women are disproportionately affected by the burden of poverty, which in turn may influence their vulnerability to depression. Women are far more likely to be victims of violence in their homes; women who experience physical violence by an intimate partner are significantly more likely to suffer depression, abuse drugs, or attempt suicide. Women who are sexually abused as children are significantly more likely to suffer depression in adulthood, and experience of sexual and other forms of violence in youth is associated with depression in adolescence.

As an example of how gender influences the risk of depression, a study with women in low-income townships of Harare, Zimbabwe, revealed the high proportion of events involving humiliation and entrapment that were related to marital crises such as being deserted by husbands and left to care for children, premature death, illness of family members, and severe financial difficulties occurring in the absence of an adequate welfare safety net. As another example, studies in South Asia have shown that the culturally determined value placed on boys (as compared to girls) adversely influences maternal mental health. The risk for postnatal depression was elevated in mothers who had a girl child, especially if the desired sex was a boy or if the mother already had living girl children (Patel, Rodrigues, & DeSouza, 2002).

The excess prevalence of alcohol abuse for men has been demonstrated in every community-based study from every region of the world although the disparities are greatest in LMICs. The wide sex differences in alcohol abuse in Latin American countries and the Caribbean have been attributed to a number of gender factors (Pyne, Claeson, & Correia, 2002). Women, for example, face strict social scrutiny about many behaviors, drinking among them. Men's consumption of alcohol takes place in the public realm, whereas women's drinking more often occurs in private. Drinking among men has social meanings, such as maintaining friendships, whereas refusing a drink can imply lack of trust and denial of mutual respect. At the other extreme, intoxication of men is more socially acceptable than that of women; indeed, women often tolerate their male partners' intoxication as being a "natural" condition of manhood. Drinking and drunkenness are more often perceived to be consistent with gendered notions of masculinity; thus, men who conform closely to cultural norms are more likely to drink. Drinking may also be a coping strategy when men face serious life difficulties, such as unemployment, and are unable to live up to the traditional expectations.

The evidence that gender plays a role in eating disorders stems from two observations: (1) the enormous sex difference in prevalence (females with these disorders vastly outnumber men with the same conditions) and (2) the very low rates of these disorders in cultures that have been relatively immune to the media-driven creation of the ideal body image for women. A study from Fiji demonstrated that the introduction of television in a media-naïve non-Westernized population is associated with a rise in attitudes favoring thinner body image and self-induced vomiting in girls (Becker, Burwell, Gilman, Herzog, & Hamburg, 2002), lending credence to the theory that the emphasis on women's thinness by the media and fashion industries is now leading to a rise in disordered eating in societies that, through the forces of globalization, are being increasingly influenced by Western imagery and values.

Another demographic characteristic associated with greater risk of mental disorders is belonging to an ethnic minority population, which has been shown to be associated with an increased risk of a range of mental disorders, including psychosis, anxiety, and depression (Veling, 2013). This relationship is attributed to a range of mechanisms related to discrimination and the traumatic experiences associated with dislocation and migration. Indigenous communities represent a particularly disadvantaged group for a range of social, historical, and political reasons, and they bear a disproportionate share of the burden of mental disorders (**EXHIBIT 10-2**).

Neighborhood Domain

There is now robust evidence indicating that the characteristics of geographical areas have an important effect on population mental health, independent of individual-level characteristics such as poverty, educational level, and gender. In the current context of large-scale global urbanization, the conditions of urban slums therefore have an important influence on mental health. For example, low neighborhood socioeconomic status has been significantly associated with worse mental health, independently of individual-level socioeconomic status (Truong & Ma, 2006).

The Burden of Mental Disorders

This section describes how the burden of mental disorders (including neurological and substance use disorders) can be calculated using disability-adjusted life-years, discusses the limitations inherent in these measures, presents the burden estimates for 2015, and finally identifies important impacts of mental disorders that are not captured in burden of disease estimates.

EXHIBIT 10-2 The Mental Health of Indigenous Peoples

As many as 370 million indigenous persons may be living in approximately 5,000 distinct groups in more than 70 countries. They exhibit a wide diversity of lifestyles, cultures, social organization, histories, and political realities. Nevertheless, they share certain historical and political realities, including being subject to violence and genocide, depopulation from infectious diseases such as smallpox and measles, dislocation from their traditional lands, extreme poverty due to the destruction of their subsistence economies, and state-organized attempts to repress and eradicate their cultures. Given this history, it is not surprising that the indigenous peoples of the world are currently experiencing relatively high rates of depression, alcoholism, and suicide, as well as high rates of infectious diseases and relatively short life expectancies (Anderson et al., 2016).

The case of the indigenous communities of Australia serves to illustrate the confluence of these historical, political, social, and economic forces and contributes to our understanding of why the rates of mental disorders are higher among indigenous peoples. The indigenous peoples of Australia had a diversity of cultures dating back at least 40,000 years before the arrival of European settlers slightly more than 200 years ago. These societies had rich cultural belief systems that attributed spiritual importance to land. Social relationships were governed by codes of behavior, and local taxonomies of illness guided the treatment of health problems. The brutal history of colonization that ultimately led to the destruction and devastation of hundreds of indigenous groups, each with a distinct language and lineage, was marked by a number of severe social adversities. Notable among these were exposure to new diseases, removal from traditional lands, enslavement on white farms, imprisonment without trials, denial of basic political rights, brutal violation of human rights, sexual abuse of women, and, perhaps most tragic of all, the "stolen generations"—the children who were forcibly removed from their parents and fostered by white families in an effort to "breed" out the native population.

Among the indigenous peoples of Australia, the consequences of this history are reflected in socioeconomic, psychosocial, and health indicators of all kinds:

- High rates of unemployment, low levels of income, and poor educational status
- Age-specific mortality rates two to seven times higher, and life expectancies more than 15 years shorter, than those of the general population
- High levels of alcoholism and suicide

It is impossible to interpret the poor mental health experienced by these communities without considering the social and historical contexts of the systematic abuse of aboriginal communities. *Ways Forward*, the Australian national inquiry into indigenous mental health conducted in the early 1990s, prioritized holistic conceptions of emotional and social well-being among these groups. From these developments, greater emphasis has been given to providing access to culturally appropriate services within mainstream healthcare settings.

To understand the contributions that mental disorders make to the global burden of disease compared to other diseases and injuries, it is necessary to measure the impact of all disorders in the same way. A common metric is needed for measurement; otherwise, it is very difficult to quantify the burden imposed by cancer, for example, compared to that imposed by depression. A commonly used metric is the disability-adjusted life-year (DALY), a time-based metric that combines the years a person lives with disability (YLD) caused by a particular disorder with the years lost from life owing to a disorder (YLL). The DALY has been used by the World Bank, WHO, and in the Global Burden of Diseases, Injuries, and Risk Factors Studies to measure the gap between the health of the population at a point in time and living to a defined life expectancy in full health. Since DALYs, YLDs, and YLLs were first estimated for the year 1990, the data sources used have been greatly expanded and the methods applied to generate the estimates improved. The changes in methods have included dealing with inconsistent coding of deaths over time and between countries, introduction of disability weights from population-representative surveys, more precise severity distributions, introduction of comorbidity adjustments, and propagation of 95% uncertainty intervals around all burden estimates. As new methods are introduced, it is necessary to recalculate GBD estimates from previous years so as to make comparison with previously published data possible. A detailed description of how these burden of disease metrics are estimated for mental disorders can be found elsewhere (GBD 2015 DALYs and HALE Collaborators, 2016).

DALYs are derived by summing YLDs and YLLs for each disorder, location, age group, sex, and year, and are now provided for more than 300 diseases and injuries. In interpreting the burden of mental disorders, one must recognize that the mortality-associated (YLL) burden estimates for mental disorders in the GBD studies should not be interpreted as suggesting

that premature death in people with MNS disorders is relatively inconsequential. Premature mortality has been repeatedly shown to be significant in populations with mental disorders (Walker, McGee, & Druss, 2015), with suicide being a major contributor and large contributions coming from cardiovascular disease and cancer (Lawrence, Hancock, & Kisely, 2013). Even in high-income countries, people with mental disorders often do not receive preventive services, such as immunizations, cancer screenings, and tobacco counseling (Druss, Rosenheck, Desai, & Perlin, 2002), and they often receive a lower quality of care for their medical conditions (Björkenstam et al., 2012; Laursen, Nordentoft, & Mortensen, 2014). Excess mortality estimates can be generated based on the GBD data; while MNS disorders were directly responsible for only 840,000 deaths in 2010, individuals with these conditions were estimated to have more than 13 million excess deaths using natural history models (Charlson, Diminic, Lund, Degenhardt, & Whiteford, 2014).

Notwithstanding these caveats, the GBD estimates show mental disorders contribute substantially to the global burden of disease, with mental and substance use disorders being the leading cause of disability globally (Whiteford et al., 2013; Whiteford, Ferrari, Degenhardt, Feigin, & Vos, 2015). The burden peaks in early adulthood for mental and substance use disorders, but is more consistent across age for neurological disorders. Females accounted for more DALYs for all mental and neurological disorders, except for mental disorders occurring in childhood, schizophrenia, substance use disorders, Parkinson's disease, and epilepsy, where males accounted for more DALYs. Overall DALYs are highest in the Eastern Europe/Central Asia regions and lowest in the East Asia/Pacific regions. The relative proportion of DALYs from MNS disorders within the overall disease burden has been estimated to be 1.6 times higher in high-income regions than in lower-income regions, largely due to the relatively higher burden of other health disorders such as infectious and perinatal diseases in LMICs. Because of their larger population, however, most of the global burden from MNS disorders is found in LMICs.

The burden estimates for 2015 are provided in **TABLE 10-4** and **FIGURES 10-2** and **10-3**. Table 10-4

TABLE 10-4 Total DALYs (Numbers and Proportions) Attributable to Mental, Neurological, and Substance Use Disorders in 2015

Cause	DALYs per 100,000 Population	Proportion of All-Cause DALYs in GBD	Proportion of Mental, Neurological, and Substance Use Disorder DALYs
Neurological Disorders			
Alzheimer's disease and other dementias	238	1.0%	9.5%
Parkinson's disease	21	0.1%	0.8%
Epilepsy	124	0.5%	5.0%
Multiple sclerosis	12	0.1%	0.5%
Migraine	329	1.3%	13.2%
Tension-type headache	23	0.1%	0.9%
Medication overuse headache	92	0.4%	3.7%
Motor neuron disease	9	0.04%	0.4%
Other neurological disorders	24	0.1%	0.9%

(continues)

TABLE 10-4 Total DALYs (Numbers and Proportions) Attributable to Mental, Neurological, and Substance Use Disorders in 2015 *(continued)*

Cause	DALYs per 100,000 Population	Proportion of All-Cause DALYs in GBD	Proportion of Mental, Neurological, and Substance Use Disorder DALYs
Substance Use Disorders			
Alcohol use disorders	112	0.5%	4.5%
Opioid use disorders	121	0.5%	4.8%
Cocaine use disorders	10	0.0%	0.4%
Amphetamine use disorders	14	0.1%	0.6%
Cannabis use disorders	6	0.02%	0.2%
Other drug use disorders	19	0.1%	0.7%
Mental Disorders			
Schizophrenia	155	0.6%	6.2%
Major depressive disorder	442	1.8%	17.7%
Dysthymia	100	0.4%	4.0%
Bipolar disorder	90	0.4%	3.6%
Anxiety disorders	246	1.0%	9.9%
Anorexia nervosa	7	0.03%	0.3%
Bulimia nervosa	8	0.03%	0.3%
Autism	63	0.3%	2.5%
Asperger's syndrome and other autistic spectrum disorders	37	0.2%	1.5%
Attention-deficit/hyperactivity disorder	6	0.03%	0.2%
Conduct disorder	58	0.2%	2.3%
Idiopathic developmental intellectual disability	34	0.1%	1.4%
Other mental and substance use disorders	96	0.4%	3.9%

Data from *Global burden of disease study 2015*. Retrieved from http://ghdx.healthdata.org/gbd-2015

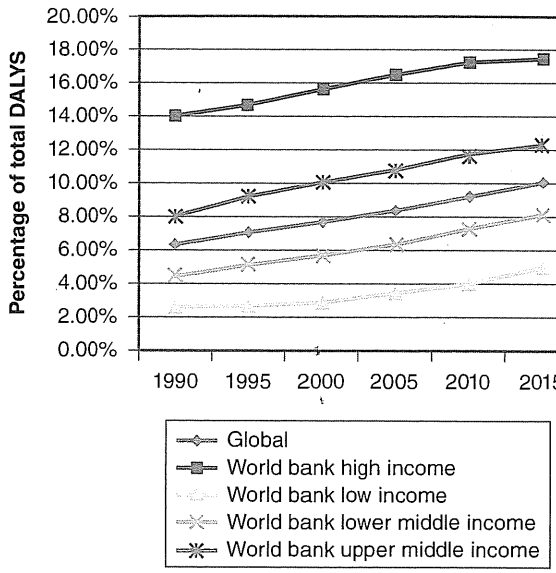


FIGURE 10-2 Mental, neurological, and substance use disorders, both sexes, all ages.

Data from *Global burden of disease study 2015*. Retrieved from http://ghdx.healthdata.org/gbd-2015

provides a global overview of the total burden from each MNS disorder included in the GBD study. The leading contributors to this burden are major depressive disorder, which accounts for almost 18% of the overall burden in the total group, with anxiety disorders and dementia both contributing close to 10%. Figure 10-2 shows that the proportionate burden from MNS disorders increased substantially in all countries, irrespective of their economic development status, between 1990 and 2015. For most disorders, the increased burden is being largely driven by population growth and aging. In areas of the world undergoing major demographic change, such as sub-Saharan Africa, where the population is expected to double by 2050, projections suggest there will be an increase of 130% in the burden of mental and substance use disorders (Charlson et al., 2014). Figure 10-3 shows that the burden is greatest in the adolescent to middle adulthood period of life, when productivity is the greatest.

To be included in the GBD data, disorders must meet the threshold for diagnosis using ICD or DSM criteria. While the application of these diagnostic criteria may bias estimates downward in regard to the burden of mental disorders in some cultures, the adoption of common case definitions is necessary to promote international comparison (Whiteford, Ferrari, & Degenhardt, 2016). Another challenge for generating estimates of mental disorder burden, and subsequently investigating trends over time and differences between countries, is the limited coverage of epidemiologic data. This is particularly problematic in LMICs and in subnational locations. As a result, estimates often have large uncertainty intervals that can mask true variations in burden between countries and over time. Furthermore, it is necessary to generate better data on the relationships between risk factors, such as economic deprivation, and the variations in burden that might be explained by these risk factors.

Depressive and Anxiety Disorders

In 2015, the global age-standardized prevalence was 3% for major depressive disorder and 1.4% for

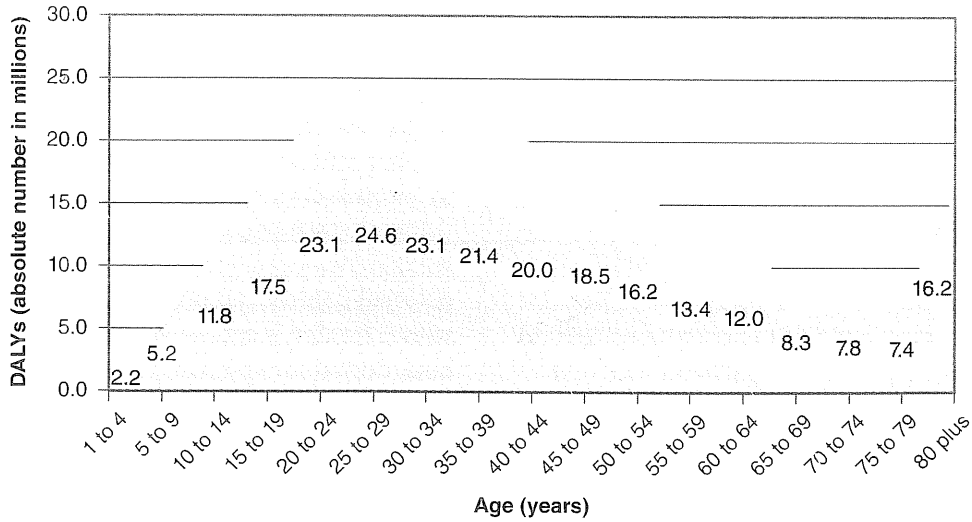


FIGURE 10-3 Global burden of mental, neurological, and substance use disorders.

Data from *Global burden of disease study 2015*. Retrieved from http://ghdx.healthdata.org/gbd-2015

dysthymia, making depressive disorders the largest contributor to the burden of disease, as measured by DALYs in the mental disorder group. The global prevalence is higher in females (5.1%) than in males (3.7%), and in countries where war and conflict are more prevalent. For example, Uganda had the highest rate of depressive disorder DALYs—although with the wide uncertainty estimates, this was not significantly different from the global mean. There is also a clear socioeconomic gradient in prevalence in many countries, with individuals having lower socioeconomic status also having increased risk for depression and anxiety disorders (Lund et al., 2010). Individual anxiety disorders are common and frequently co-occur with each other.

To prevent over-counting, GBD 2015 provides estimates for any anxiety disorder—a grouping that includes generalized anxiety disorder, panic disorder, and phobic disorders (agoraphobia, social phobia, and specific phobias) (Baxter, Vos, Scott, Ferrari, & Whiteford, 2014). It also includes obsessive–compulsive disorder, post-traumatic stress disorder, and acute stress disorders, although these are no longer classified as anxiety disorders in DSM-5. In 2015, the global age-standardized prevalence for all anxiety disorders combined was 3.6% (4.6% for females and 2.6% for males), making these disorders the second largest contributor to the burden of disease imposed by MNS disorders, as measured by DALYs. As is true for depression, there is considerable variability in the estimates, with anxiety disorder prevalence being impacted by factors such as sex, age, culture, conflict, urbanicity, and economic status (Baxter, Scott, Vos, & Whiteford, 2013). For example, a systematic review and meta-analysis of post-traumatic stress disorder alone in the general population in areas exposed to conflict found the prevalence to be 12.9%, after controlling for an extensive range of covariates (Charlson, Baxter, Cheng, Shidhaye, & Whiteford, 2016).

Schizophrenia

The age-standardized prevalence of schizophrenia was estimated in the GBD studies to be approximately 3% globally. This prevalence did not change from 1990 to 2015; however, the number of people with schizophrenia increased from 14.4 million to 23.4 million during this period, due primarily to population growth and aging. In 2015, schizophrenia contributed 15.5 million DALYs to the overall burden of disease globally, with roughly equal burdens noted in males and in females. Substantially higher prevalent cases and DALYs of schizophrenia were found lower-income regions of the world—a reflection of population size, but also coinciding with the highest treatment gaps. For example, China had the highest rate of schizophrenia DALYs, but this was closely followed by the U.S. rate, and neither country's rate was significantly higher than the global mean.

Bipolar Disorder

The global age-standardized prevalence of bipolar disorder was estimated at 0.5% across both sexes. As with the majority of mental disorders, the prevalence of bipolar disorder remained unchanged between 1990 and 2015, but due to population growth and changing age structures, the number of people with bipolar disorder increased from approximately 30 million in 1990 to 44 million in 2015. In terms of burden, bipolar disorder was responsible for 9 million DALYs, equating to 0.35% of all global DALYs in 2015. The DALY rates were consistent across the globe, with the difference between the lowest country estimate (China) and the highest country estimate (New Zealand) not differing significantly.

Substance Use Disorders

The burden of substance use disorders varies considerably across and within countries, between subgroups in a given population, and according to the substance being abused. Unlike other mental and neurological disorders, variations in substance use burden are influenced by additional factors, such as supply and availability of drugs, which can change prevalence and, in turn, burden. If dependence on tobacco (arguably the most common substance to be abused) is excluded, alcohol use disorders (AUD) are the most common substance abuse disorder in most countries. While AUD can refer to the entire range of health conditions associated with drinking alcohol above the recommended limit established by WHO, alcohol use disorders in the GBD studies refer only to alcohol dependence as defined by the ICD. Illicit drugs are those substances whose use outside medical settings has been prohibited under international and national control systems. In the GBD study, the drugs whose burden is estimated are opioids (including heroin), cannabis, amphetamines, and cocaine.

Globally, AUD were the most prevalent substance use disorders, with 63.5 million estimated cases in 2015. Cannabis dependence and opioid dependence were the most common illicit drug use disorders (19.8 million cases and 16.7 million cases, respectively). There were substantial geographic variations in the burden of disease and contrasting patterns for the association between total alcohol and illicit drug-attributable burden and per

capita income. Alcohol burden was highest in LMICs (with Russia being the highest), while the burden from illicit drugs was highest in Eastern European countries and the United States.

Childhood Disorders

The majority of mental disorders have their initial onset during childhood and adolescence, making this a crucial period for early intervention and identification. While substance use disorders tend to demonstrate a sharp increase in prevalence (and therefore burden) from late adolescence onward, certain mental and neurological disorders demonstrate significant burden between ages 5 to 14 years. Across both sexes, conduct disorder, depressive disorders, anxiety disorders, and autism spectrum disorders are responsible for almost 7.5% of all DALYs worldwide in this age group. For neurological disorders, migraine and epilepsy make up the majority of the burden of disease for children and adolescents (1.8% and 1.4%, respectively).

The implications of these estimates are significant, given that 85% of children and adolescents live in LMICs that generally have few or no child- and adolescent-specific mental health services. Furthermore, as infectious diseases continue to be successfully prevented and treated, more infants in these regions will survive into childhood and adolescence and, therefore, reach the ages where the incidence of mental disorders is higher. As such, it is important for these disorders to be recognized as significant contributors to the burden of disease in children and adolescents and for health resources to be allocated based on both current and future needs.

Dementia

The population of almost all countries is aging, and the size of the older population is growing fastest in low-income countries. Between 2015 and 2050, the number of older people living in higher-income countries is forecast to increase by 56%, compared with 138% in upper middle-income countries, 185% in lower middle-income countries, and 239% in low-income countries (https://www.alz.co.uk/research/WorldAlzheimerReport2015.pdf). Dementia is becoming a major contributor to global burden, with the total DALYs doubling for both men and women between 1990 and 2015.

Wider Health Impact of Mental Disorders

The limitations imposed by the GBD study methodology means the full impact of mental disorders is not captured in the DALY metric. Debate has arisen about where and how the burden of disease estimates related to mental disorders could be improved (Vigo, Thornicroft, & Atun, 2016; Whiteford, Ferrari, & Vos, 2016) in terms of measuring direct burden. One area where efforts to improve burden of disease estimates have been pursued is the relatively small number of deaths attributed to mental disorders. Suicide, for example, is recorded under "injuries" in the ICD cause-of-death coding guidelines. The inclusion of suicide deaths attributable to mental disorders into DALYs would have increased the burden of mental and substance use disorders in 2010 from 7.4% to 8.3% and increased the global ranking of these disorders from the fifth to the third leading cause of burden of disease (Ferrari et al., 2014).

The contribution that disorders make, as risk factors for other health outcomes, can also be dealt with through the comparative risk assessment (CRA) component of the burden of disease studies. The CRA quantifies the burden attributable to each risk factor exposure compared to an alternative (counterfactual) exposure distribution (GBD 2015 Risk Factors Collaborators, 2016). Mental disorders are considered risk factors if associated with elevated risk of mortality or disability from other diseases or injuries, though this area of the GBD studies is underdeveloped compared with the measurement of the direct burden of disease.

The burden of disease attributable to major depression as a risk factor for suicide and ischemic heart disease has been estimated (Charlson, Stapelberg, Baxter, & Whiteford, 2011; Li, Page, Martin, & Taylor, 2011). In 2010, major depression explained a further 16 million DALYs when it was considered as a risk factor for suicide. Overall, nearly half of DALYs originally allocated to suicide (included as intentional injuries in the GBD cause of death list) can be reattributed to major depression alone (Ferrari et al., 2013). Alcohol use and injecting-drug use as risk factors are now included in burden of disease estimates. In 2013, injecting-drug use was estimated to cause 39% of DALYs due to hepatitis C, 4% of DALYs due to HIV, and 1% of DALYs due to hepatitis B (Degenhardt et al., 2016). Injecting-drug use's contribution to the HIV burden of disease was highest in LMICs, and injecting-drug use's contribution to the hepatitis C burden of disease was highest in high-income countries. In 2015, DALYs attributed to alcohol use disorders were concentrated among transport injuries, cirrhosis, and cancers. Using DALYs per 100,000 population, Eastern Europe and southern sub-Saharan Africa have the highest estimated alcohol-attributable burden of disease, while Eastern Europe and North America have the highest illicit drug–attributable burden of disease.

This CRA area needs to be greatly expanded to capture the comorbidity between mental and other disorders. There is strong comorbidity between diet, diabetes, and mood disorders (Dipnall et al., 2015; Grigsby, Anderson, Freedland, Clouse, & Lustman, 2002), for example, and depression may increase the risk for diabetes (Rotella & Mannucci, 2013). Between 10% and 20% of people with schizophrenia have type 2 diabetes (Holt, Bushe, & Citrome, 2005). Depression is a risk factor for both ischemic heart disease (Charlson et al., 2013) and stroke (Pan, Sun, Okereke, Rexrode, & Hu, 2011). There is also strong evidence of the increased risk for depression *after* myocardial infarction (Strik, Lousberg, Cheriex, & Honig, 2004) and stroke (Aben et al., 2006). Infectious disease, cancer, diabetes, and cardiovascular disease are all more common with excess alcohol consumption (Rehm, 2011), with illicit drug use (Degenhardt & Hall, 2012), and in those persons with severe mental disorders (Hert et al., 2011).

In addition, anxiety and mood disorders and other common mental disorders (often called "somatoform disorders") can present in primary health care/general medical settings with physical symptoms (Escobar, Waitzkin, Silver, Gara, & Holman, 1998; Gureje, Simon, Ustun, & Goldberg, 1997). Such symptoms, which are sometimes termed "medically unexplained" because they cannot be attributed to physical disorders (Creed et al., 2012), are associated with considerable disability and high levels of help seeking and associated healthcare costs (Konnopka et al., 2012).

The coexistence of mental and physical disorders is also associated with worse outcomes of the physical disorder, through a variety of mechanisms. For example, depression after acute myocardial infarction has been associated with fatal and nonfatal cardiovascular events, adverse overall health status, and increased costs (Lichtman et al., 2014). Similarly, depression is associated with an increased risk of poor glycemic control and, therefore, increased mortality in people with diabetes (Lin et al., 2010). Similar findings have been reported for patients with HIV/AIDS, in whom depression is recognized as a predictor of worse clinical outcomes and poorer quality of life, often associated with a reduction in medication adherence (Nanni, Caruso, Mitchell, Meggiolaro, & Grassi, 2015). Clear recommendations have been made for improving the treatment of people with comorbid mental and physical disorders, especially those with severe mental disorders (Hert et al., 2011).

Another relationship that needs to be addressed is the strong association of mental disorders with a range of women's health concerns. Depression is strongly associated with dysmenorrhea, dyspareunia, and pelvic pain (Latthe, Mignini, Gray, Hills, & Khan, 2006). In some cultures in Asia, gynecologic complaints, such as abnormal vaginal discharge, are associated with depression (Patel et al., 2006). Maternal mental disorders are associated with a range of adverse outcomes in children, including low birth weight, premature birth, poor infant growth, and emotional, cognitive, and behavioral developmental delays that can persist into adolescence and beyond (Stein et al., 2014).

The Wider Social and Economic Impact of Mental Disorders

Just as one disease burden metric (such as the DALY) cannot capture the full health impact of mental disorders, it also cannot capture all of the social and economic impacts of these disorders on the individual, family, or society. Disease burden estimates do not account for the denial of basic human rights, ranging from limited opportunities for education and employment to torture and denial of freedom, sometimes within healthcare institutions. They also do not account for the time spent by family members in support and caring for the individual with mental disorder, the costs of treatment, or the productivity loss costs to the individual and his or her family.

A study undertaken for the World Economic Forum estimated that the cumulative global impact of mental disorders in terms of lost economic output may amount to $16 trillion over 20 years (Bloom et al., 2011). The Organisation for Economic Co-operation and Development (OECD, 2015) has conservatively estimated that the impact of mental disorders in high-income countries ranges from 2.3% to 4.4% of gross domestic product (GDP). Economic costs attributable to alcohol use and alcohol use disorders alone are estimated to amount to the equivalent of 1.3% to 3.3% of GDP in a range of high-income and middle-income countries, with more than two-thirds of this loss represented by productivity losses (Rehm et al., 2009). The global cost of dementia in 2015 has been estimated at $818 billion, equivalent to 1.09% of global GDP (Alzheimer's Disease International, 2015). Additionally, the social adversities associated with mental disorders, given the large and growing proportions of the global population affected by conflict or displacement due to environmental degradation and climate change, will likely increase the future burden of mental disorders.

In high- and middle-income countries, the productivity losses attributable to mental disorders have been shown to be very significant. As an example, the lost taxation revenue in Australia from people age 45 and older who retire early due to depression has been

estimated at AUD$ 278 million (USD$ 190 million), and income support for those individuals has been estimated at AUD$ 407 million (USD$ 278 million) in 2009 terms. The total impact on GDP of this group for this disorder alone was estimated at AUD$ 1.7 billion (USD$ 1.2 billion) (Schofield et al., 2011). The value of informal caring provided by family members was approximately AUD$13.2 billion (USD$10.3 billion) in 2015 (Diminic et al., 2016), much greater than the AUD$ 8 billion (USD$ 6.3 billion) that the national and state governments spent on mental health services in Australia.

Although the economic burden is large, increased spending within the health sector to increase treatment coverage for mental disorders appears to be more than offset by economic productivity gains and reduced outlays on social and income support (OECD, 2015; Wang et al., 2007). Evidence-based health and social interventions can avert the long-term cost burden and have a broad range of payoffs, both within the public sector and more widely, such as through better educational performance, improved employment/earnings, and reduced crime (Knapp, McDaid, & Parsonage, 2011). The view that treatment of mental disorders in LMICs is prohibitively expensive is a myth that needs to be dispelled. A fully scaled-up package of mental health care in sub-Saharan Africa and south Asia, based on a comparative cost-effectiveness analysis of 44 individual or combined interventions, has been estimated at USD$ 3 to USD$ 4 per person within a population (Chisholm, Naci, Hyder, Tran, & Peden, 2012). Of course, scaled-up treatment of common mental disorders globally can lead to large productivity gains. In a model consisting of 36 countries between 2016 and 2030, USD$ 230 billion was needed for scaled-up treatment of depression and USD$ 169 billion for scaled-up treatment of anxiety disorders (Chisholm, Sweeny, et al., 2016).

Interventions

This section briefly considers the role of mental health policies, human resources for mental health care, and the evidence for the prevention and treatment of mental disorders.

Mental Health Policies and Plans

A mental health policy presents the values, principles, and objectives for improving mental health and reducing the burden of mental disorders in a population. It should define a vision for the future and help to establish a model for action. A policy should be distinguished from a plan, which is a strategy for implementing actions to achieve the objectives of a policy.

In some countries, mental health policies are restricted to psychiatric services. However, a broader scope is preferable—one in which mental health services in general are addressed. These services may include primary care and specialized care, as well as all aspects of intervention—that is, promotion, prevention, treatment, and ongoing care (WHO, 2003c). Policies need to address the coordination between mental health services themselves, as well as between mental health services and other services such as housing, education, and employment. Other key issues that policies should address include financial arrangements for the private and public sectors, expenditure prioritization, and individual and organizational capacity development (WHO, 2003a). Finally, policies need to provide for continuous evaluation of mental health outcomes to ensure that those policies remain appropriate to contemporary circumstances and lead to effective services.

A country's capacity to deliver appropriate mental health services to its population is seriously hampered by the absence of a mental health policy. Thus, it is cause for concern that only 68% of countries (77% of those that responded to the WHO survey) have mental health policies (WHO, 2014). LMICs are less likely to have these kinds of policies: For example, only 71% of countries in Africa have established such policies. This is, however, a substantial improvement in recent years: In 2001, only 50% of African countries in Africa had established mental health policies (WHO, 2001).

Partly in response to this shortcoming, WHO developed the Mental Health Policy and Service Guidance Package during 2000–2005. This package consists of a series of interrelated, user-friendly modules designed to assist with policy development and service planning. One module provides a series of steps that can be taken to develop mental health policies: (1) assess the population's needs; (2) gather evidence for an effective policy; (3) consult and negotiate; (4) exchange ideas with other countries; (5) set out the vision, values, principles, and objectives of the policy; (6) determine areas for action; (7) identify the roles and responsibilities of different sectors; and (8) conduct pilot studies (WHO, 2005b).

Human Resources for Mental Health Care

The implementation of mental health policies and plans depends on both the quantity and the quality of the personnel available to implement interventions. There are vast differences among regions of the world

in terms of the availability of mental health professionals (**TABLE 10-5**). In almost all countries, there is a gap between the supply of personnel and the demand for their services. The deleterious consequences of the low numbers of mental health professionals are magnified when one considers that the distribution of mental health professionals is frequently uneven between countries in each region, and within countries. The number of mental health workers per 100,000 population is considerably higher in urban areas, for example. Also, the available personnel are often not used efficiently, and staff may be demoralized and demotivated.

Mental health programs require a cadre of well-trained mental health specialists, such as psychiatrists, psychologists, social workers, mental health occupational therapists, and psychiatric nurses. They are responsible for functions such as the management of patients with complex conditions, supervision and training of other specialists and generic health workers, research, planning, management, and consultation–liaison. It is vital that specialists stay abreast of modern international developments that are relevant for the functions they perform, including honing their skills of evaluation, capacity building, and supervision (Patel, Simon, Chowdhary, Kaaya, & Araya, 2009). At the same time, the application of such developments should be informed by local research and experience. Training efforts for mental health specialists should occur in parallel with training for generic health workers such as doctors, nurses, and community health workers, who provide the majority of care in LMICs. In keeping with the objectives of WHO's mhGAP program, a major initiative in recent years has been the training and supervision of nonspecialist health providers in the provision of basic mental health services—an approach known as "task sharing" or "task-shifting" (Kakuma et al., 2011). In keeping with the objectives of the Grand Challenges in Global Mental Health initiative (Collins et al., 2011), substantial research funding has been devoted to research in this area in LMICs, and the evidence in support of this approach is presented later in this chapter.

One sector that is particularly important in LMICs is the traditional health sector. In many LMICs, the majority of people seek care from traditional healers before seeing allopathic healers. There are several ways in which such providers can be engaged to provide mental health care. They can work side by side with allopathic mental health services, perhaps even operating from the same premises; they can be trained to recognize mental disorders and refer people suffering from them to allopathic services; and they can be recruited and trained to function as allopathic mental health workers. Whatever arrangements are made at an organizational level, individual mental health services providers should attempt to establish whether their patients are being subjected to any traditional

TABLE 10-5 Median Number of Mental Health Professionals per 100,000 Population in Each WHO Region and in the World

WHO Region	Psychiatrists	Psychiatric Nurses	Psychologists Working in Mental Health	Social Workers Working in Mental Health
Africa	0.1	0.6	0.1	0.1
Americas	1.1	5.3	1.4	0.6
Eastern Mediterranean	0.9	3.1	0.4	0.3
Europe	7.0	24.1	2.7	1.7
Southeast Asia	0.4	2.6	0.1	0.1
Western Pacific	0.9	5.7	0.9	1.5
World	0.9	5.1	0.7	0.4

Data from World Health Organization (WHO). (2014). *Mental health atlas 2014*. Geneva, Switzerland: World Health Organization.

interventions that are harmful. If they are, they should receive education and counseling that aim to reduce exposure to such negative interventions. Conversely, traditional practices that are helpful can be incorporated into allopathic care (Institute of Medicine, 2001).

Prevention and Treatment of Mental, Neurological, and Substance Use Disorders

Interventions for mental disorders have progressed enormously in the past few decades. The *Disease Control Priorities*, third edition (DCP-3), released by the World Bank, provides a synthesis of the evidence base and recommendations for the packages for prevention and treatment of MNS disorders (Patel et al., 2016). These recommendations identify the specific interventions for each group of disorders (**TABLE 10-6**) and the platforms through which they can be scaled up (**TABLE 10-7**).

Population-Level Recommendations

Evidence-based population-level recommendations include legislative measures to restrict access to means of self-harm and suicide (e.g., limiting access to guns and pesticides, such as through the use of lockboxes) and limiting availability of and demand for alcohol (e.g., through taxation and increased prices). Effective interventions, strategies, and policies to prevent and reduce substance use disorders can be categorized as regulatory, community based (including education), and health services based.

Prohibition has been attempted for alcohol products and is currently in place in some countries; this policy is also used with classes of substances including opioids, cannabinoids, and cocaine in most countries. Although prohibition can dramatically reduce substance use disorders in the short term, its costs in terms of civil disobedience and crime are enormous—so much so, that, in general, prohibition is not regarded as an acceptable policy option, with the exception of specific circumstances, such as drinking alcohol and driving (Wolf & Midanik, 2013).

Regulatory interventions include taxation, restrictions on availability, and total bans on all forms of direct and indirect advertising. Increases in alcohol taxes, for example, have been shown to reduce both the prevalence and the consumption of alcohol products. For young people, laws that raise the minimum legal drinking age reduce alcohol sales and problems among young drinkers. Reductions in the hours and days of sale, numbers of alcohol outlets, and restrictions on access to alcohol are all associated with reductions in both alcohol use and alcohol-related problems. A meta-analysis of studies in LMICs found a strong inverse effect between alcohol consumption and alcohol price and/or taxation (Sornpaisarn, Shield, Cohen, Schwartz, & Rehm, 2013), which is comparable to the impact of increasing price/taxes and decreasing consumption in high-income countries.

At the population level, there is also good practice evidence for interventions that seek to raise mental health literacy and reduce stigma and discrimination (Thornicroft et al., 2016). Social contact interventions, in which people engage with persons with mental disorders in recovery, changes attitudes and has the potential to instill behavior change (Corrigan, Morris, Michaels, Rafacz, & Rusch, 2012). Interventions within the criminal justice system are effective means to reduce alcohol and drug use, and to treat behavior disorders in adolescents and psychosis among adults. For example, mental health input in the criminal justice system can prevent the inappropriate imprisonment of people with mental disorders, make treatment for mental disorders available in prisons, and reduce the mental health sequelae of imprisonment for prisoners and their families. In high-income countries, mental health training of police through crisis intervention teams (CIT) reduces incarceration, increases mental health treatment, and reduces violence experienced both by police and by persons with mental disorders (Compton, Broussard, Munetz, Oliva, & Watson, 2011). There is increased attention to CIT and similar models in LMICs. For example, in Liberia, CIT training of police both improved mental health outcomes and reduced use of physical force against persons in acute psychological distress during the 2013–2016 Ebola outbreak (Kohrt, Blasingame, et al., 2015).

Community-Level Recommendations

Community-based mental health care is a major objective of the World Psychiatric Association and other mental health advocates and practitioners (Thornicroft et al., 2010). Life-skills training in schools to build social and emotional competencies is an example of a best practice to reduce the burden of MNS disorders. Systematic reviews of mental health promotion for children and adolescents have shown that school-based programs improve self-esteem, motivation, and self-efficacy (Barry, Clarke, Jenkins, & Patel, 2013; Fazel, Patel, Thomas, & Tol, 2014). Community mobilization and education have been used to prevent substance abuse in many countries. A crucial setting for prevention is in schools, where the goal of most alcohol education programs is to change adolescents' drinking beliefs, attitudes, and behaviors, or to modify factors such as general social skills and self-esteem

TABLE 10-6 Effective Interventions for the Prevention, Treatment, and Care of MNS Disorders

	Type of Disorder	Preventive Interventions	Drug and Physical Interventions	Psychosocial Interventions
Mental Disorders in Adulthood				
Schizophrenia (5.3% of total MNS DALYs)	▪ Chronic or relapsing condition characterized by delusions, hallucinations, and disturbed behavior		▪ Antipsychotic medication***	▪ Family therapy/ support** Community-based rehabilitation* ▪ Self-help and support groups*
Mood and anxiety disorders (41.9% of total MNS DALYs)	▪ Group of conditions characterized by somatic, emotional, cognitive, and behavioral symptoms; bipolar disorder is associated with episodes of elated and depressed moods	▪ Cognitive-behavioral therapy for persons with subthreshold symptoms**	▪ Antidepressant, anxiolytic, mood stabilizer, and antipsychotic medications*** ▪ Electroconvulsive therapy (ECT) for severe refractory depression**	▪ Cognitive-behavioral therapy*** ▪ Interpersonal therapy**
Mental and Developmental Disorders in Childhood and Adolescence				
Conduct disorder (2.2% of total MNS DALYs)	▪ Pattern of antisocial behaviors that violate the basic rights of others or major age-appropriate societal norms	▪ Life skills education to build social and emotional well-being and competencies** ▪ Parenting skills training** ▪ Maternal mental health interventions**		▪ Parenting skills training** ▪ Cognitive-behavioral therapy*
Anxiety disorders (2.3% of total MNS DALYs)	▪ Excessive or inappropriate fear, with associated behavioral disturbances that impair functioning	▪ Parenting skills training** ▪ Maternal mental health interventions**		▪ Cognitive-behavioral therapy**
Autism (1.6% of total MNS DALYs)	▪ Severe impairment in reciprocal social interactions and communication skills, as well as the presence of restricted and stereotypical behaviors			▪ Parental education and skills training* ▪ Educational support*

Attention-deficit/ hyperactivity disorder (ADHD) (0.2% of total MNS DALYs)	▪ Neurodevelopmental disorder characterized by inattention and disorganization, with or without hyperactivity–impulsivity, causing impairment of functioning	▪ Psychosocial stimulation of infants and young children*	▪ Methylphenidate**	▪ Parenting skills training** ▪ Cognitive-behavioral therapy**
Intellectual disability (idiopathic) (0.4% of total MNS DALYs)	▪ Significantly impaired cognitive functioning and deficits in two or more adaptive behaviors	▪ Psychosocial stimulation of infants and young children** ▪ Perinatal interventions (e.g., screening for congenital hypothyroidism)** ▪ Population-based interventions targeting intellectual disability risk factors (e.g., reducing maternal alcohol use)*		▪ Parental education and skills training* ▪ Educational support*
Neurological Disorders				
Migraine (8.7% of total MNS DALYs)	▪ Episodic attacks where headache and nausea are the most characteristic attack features; the headache itself, lasting for hours to 2–3 days, is typically moderate or severe and likely to be unilateral, pulsating, and aggravated by routine physical activity	▪ Prophylactic drug treatment with propranolol or amitriptyline***	▪ Drug treatments: Aspirin or one of several other nonsteroidal anti-inflammatory drugs [NSAIDs]***	▪ Behavioral and cognitive interventions*
Epilepsy (6.8% of total MNS DALYs)	▪ A brain disorder traditionally defined as the occurrence of two unprovoked seizures occurring more than 24 hours apart with an enduring predisposition to generate further seizures	▪ Population-based interventions targeting epilepsy risk factors (e.g., preventing head injuries; neurocysticercosis prevention)*	▪ Standard antiepileptic medications (phenobarbital, phenytoin, carbamazepine, valproic acid)*** ▪ Epilepsy surgery**	
Dementia (4.4% of total MNS DALYs)	▪ A neuropsychiatric syndrome characterized by a combination of progressive cognitive impairment, behavioral, and psychological symptoms (BPSD) and functional difficulties	▪ Cardiovascular risk factors management (healthy diet, physical activity, tobacco use cessation)*	▪ Cholinesterase inhibitors and memantine for cognitive functions; medications for management of BPSD*	▪ Caregiver education and support and behavioral training, and environmental modifications ** ▪ Interventions to support carers of people with dementia**

(continues)

TABLE 10-6 Effective Interventions for the Prevention, Treatment, and Care of MNS Disorders *(continued)*

	Type of Disorder	Preventive Interventions	Drug and Physical Interventions	Psychosocial Interventions
Substance Use Disorders				
Alcohol use disorders (6.9% of total MNS DALYs)	▪ Harmful use: "A pattern of alcohol use that causes damage to physical or mental health" ▪ Alcohol dependence: A cluster of physiological, behavioral, and cognitive phenomena in which the use of a substance takes on a much higher priority for a given individual than other behaviors that once had greater value	▪ Excise taxes*** ▪ Restriction on sales** ▪ Minimum legal age** ▪ Measures to prevent drunk driving** ▪ Advertising bans* ▪ Restrictions on density* ▪ Opening hours, closing hours, and days of sale** ▪ Family interventions*	▪ Naltrexone, acamprosate*	▪ Family support* Motivational enhancement, brief advice, cognitive-behavioral therapy** ▪ Screening and brief interventions*** ▪ Self-help groups*
Illicit drug use disorders (7.8% total MNS DALYs)	▪ A pattern of regular use of illicit drugs characterized by significantly impaired control over use and physiological adaptation to regular consumption as indicated by tolerance and withdrawal	▪ Psychosocial interventions with primary school children (e.g., good behavior game or strengthening families program)*	▪ Opioid substitution therapy (e.g., methadone, buprenorphine)***	▪ Self-help groups, psychological interventions (e.g., cognitive-behavioral therapy)*
Suicide and Self-Harm				
Suicide and self-harm (1.47% of GBD; 22.5 million YLLs or 62.1% of suicide YLLs were attributed to mental and substance use disorders in 2010)	▪ Suicide: The act of deliberately killing oneself ▪ Suicide attempt: Any nonfatal suicidal behavior; includes intentional self-inflicted poisoning, injury, or self-harm that may or may not have a fatal intent or outcome	▪ Policies and legislation to reduce access to the means of suicide (e.g., pesticides)** ▪ Decriminalization of suicide* ▪ Responsible media reporting of suicide*	▪ Effective drug interventions for underlying MNS disorders** ▪ Emergency management of poisoning**	▪ Social support; psychological therapies for underlying MNS disorders*

Notes: Strength of evidence: *** evidence of cost-effectiveness (CE); ** Strong evidence of effectiveness (E) but not of CE; * modest evidence of E and either not CE or no evidence of CE.

TABLE 10-7 Intervention Priorities for MNS Disorders by Delivery Platform

Platform for Intervention Delivery						
			Healthcare Platforms			
Problem Area	Population Platform	Community Platform	Self-Care and Management	Primary Health Care	First-Level Hospital	Specialized Care
All MNS disorders	Awareness campaigns to increase mental health literacy and address stigma and discrimination Legislation on protection of human rights of persons affected by MNS disorders	Training of gatekeepers (e.g., community workers, police, teachers) in early identification of priority disorders, provision of low-intensity psychosocial support, and referral pathways Self-help and support groups (e.g., for alcohol use disorders, for epilepsy, parent support groups for children with developmental disorders, and for survivors of suicide)				
Adult mental disorders	Child protection laws		Physical activity Relaxation training Education about early symptoms and their management web- and smartphone-based psychological therapy for depression and anxiety disorders	Screening and proactive case finding for psychosis, depression, and anxiety disorders Diagnosis and management of depression and anxiety disorders* Continuing care of schizophrenia and bipolar disorder	***Diagnosis and management of acute psychoses*** Management of severe maternal depression* Management of depression and anxiety disorders in mothers, people with HIV, and people with other noncommunicable diseases*	*Electroconvulsive therapy for severe or refractory depression* Management of refractory psychosis with clozapine

(continues)

TABLE 10-7 Intervention Priorities for MNS Disorders by Delivery Platform *(continued)*

Platform for Intervention Delivery						
			Healthcare Platforms			
Problem Area	Population Platform	Community Platform	Self-Care and Management	Primary Health Care	First-Level Hospital	Specialized Care
Child mental and developmental disorders	Child protection laws	**Parenting programs in infancy to promote early child development** **Life skills training in schools to build social and emotional competencies** Parenting programs in early and middle childhood (2–14 years) Improve the quality of antenatal and perinatal care to reduce risk factors associated with intellectual disability	Web- and smartphone-based psychological therapy for depression and anxiety disorders	Screening for developmental disorders in children and maternal mental health interventions Parent skills training for developmental disorders Psychological treatment for mood, anxiety, ADHD, and disruptive behavior disorders*	**Diagnosis of childhood mental disorders such as autism and ADHD** Stimulant medication for severe cases of ADHD Newborn screening for modifiable risk factors for intellectual disability	
Neurological disorders	Policy interventions to address the risk factors for cardiovascular diseases (e.g., tobacco control)		**Self-managed treatment of migraine** Self-identification/management of seizure triggers Self-management of risk factors for vascular disease (e.g., healthy diet, physical activity, tobacco use)	Diagnosis and management of epilepsy and headaches Community-based screening for detection of dementia Interventions to support caregivers of patients with dementia *Management of prolonged seizures or status epilepticus*	Diagnosis of dementia and secondary causes of headaches	Surgery for refractory epilepsy

Alcohol and illicit drug use disorders	**Regulate the availability and demand for alcohol (e.g., increases in excise taxes on alcohol products, advertising bans)** Penalize risky behaviors associated with alcohol (e.g., enforcement of BAC limits)	Awareness campaigns to reduce maternal alcohol use during pregnancy	Self-monitoring of substance use	**Screening and brief interventions for alcohol use disorders** Opioid substitution therapy (e.g., methadone and buprenorphine) for opioid dependence	*Management of severe dependence and withdrawal*	Psychological treatments (e.g., CBT) for refractory cases*
Suicide and self-harm	**Control the sale and distribution of means of suicide (e.g., pesticides)** Decriminalize suicide	Safer storage of pesticides in the community and farming households	Web- and smartphone-based treatment for depression and self-harm	Primary health-care packages for underlying MNS disorders (as described above)* Planned follow-up and monitoring of suicide attempters* *Emergency management of poisoning*	Treatment of comorbid mood and substance use disorder*	Specialist health-care packages for underlying MNS disorders (as described above)

Abbreviations: ADHD, attention-deficit/hyperactivity disorder; BAC, blood alcohol concentration; CBT, cognitive-behavioral therapy; MNS = mental, neurological, and substance use.

Italic type denotes urgent care; underlined type denotes continuing care; normal font denotes routine care.

Recommendations in **bold** = best practice; recommendations in normal font = good practice.

* There is no fixed time period for the management of these complex conditions. For example, in the management of depression, some individuals need relatively short periods of engagement (e.g., 6–12 months for a single episode) at the one end, while others may need maintenance care for several years (e.g., when there is a relapsing course).

EXHIBIT 10-3 Community Care for Severe Mental Disorders in Low-Resource Settings

A community mental health program for severe mental disorders in a rural setting in India was initiated in partnership with Ashagram ("village of hope"), a nongovernmental organization (NGO) working toward the rehabilitation for people affected by leprosy. The NGO was located in Barwani, one of the poorest districts in India. Mental health care was routinely provided through an outpatient clinic that required patients to travel to the hospital to be assessed and to receive treatment.

A community-based rehabilitation (CBR) model was devised for patients with chronic schizophrenia, based on a three-tiered service delivery system. CBR relies on the active participation of the disabled and their families in rehabilitation and takes specific notice of prevailing social, economic, and cultural issues. The highest tier was outpatient (OP) care. All patients were started on antipsychotic medication. The second tier consisted of mental health workers (MHWs) drawn from the local community. After a 60-day training program, the MHWs worked with patients, families, and the local community in providing services. Each MHW served five or six contiguous villages and carried a total caseload of 25 to 30 patients, including some of the study subjects. The third tier consisted of family members and other key persons in the community who formed the local village health groups (*samitis*). These groups served as a forum for the members to plan relevant rehabilitation measures and reduce social exclusion.

The evaluation of the CBR program showed that, among patients who actively participated, this model was more effective than standard outpatient treatment, as determined by a range of clinical and functional outcomes (Chatterjee, Patel, Chatterjee, & Weiss, 2003). A four-year follow-up of the cohort of persons in the CBR care arm showed that adherence with medication and participation in self-help groups predicted a favorable outcome (Chatterjee, Pillai, Jain, Cohen, & Patel, 2009). A subsequent randomized controlled trial of this intervention in three sites confirmed its beneficial effects in reducing levels of disability in people with chronic schizophrenia in India (Chatterjee et al., 2014). Because a lack of professional resources is a reality in LMICs, the CBR method takes advantage of active local community participation and low levels of technical expertise to deliver services.

that are assumed to underlie adolescent drinking. Structured universal interventions for children in settings of armed conflict have positive effects for behavior, self-esteem, and coping.

The most effective promotion initiatives take a multicomponent approach by integrating their activities with programs on topics such as microfinance or reproductive and sexual health education. Standalone mental health promotions, such as only doing cognitive-behavioral therapy, have produced fewer benefits. Other good practices include parenting programs with infants for early child development.

Community care using locally available resources is a key strategy for enabling people with severe mental disorders and disabilities to remain in the community. One such example is the Ashagram model in rural India (**EXHIBIT 10-3**).

Preventive efforts directed toward reducing the risk factors for epilepsy and developmental disabilities have focused on improving prenatal care and promoting safe delivery. Other preventive strategies include better fever control in children; strategies aimed at reduction of the causes of brain injury, such as children's use of safety seats and helmets; control of infectious and parasitic diseases that infect the brain; genetic counseling; screening programs for conditions that are known to be associated with mental handicaps, such as hypothyroidism; micronutrient supplementation, such as with iodine; and reductions in environmental levels of toxins such as lead.

Healthcare-Level Recommendations

Best practices at the healthcare level include self-management psychological interventions, such as web-based psychological therapy for depression and anxiety. Given the tremendous treatment gap, the lack of available mental health specialists in most of the world, and the desire to move treatment from institutions to communities, numerous efforts are being made to deliver mental health through primary care (Gwaikolo et al., 2017; Lund et al., 2012; Petersen et al., 2016; WHO, 2010). A key innovation to attain this goal is to address the supply-side barrier of inadequate mental health specialists through task sharing of front-line interventions with nonspecialist health workers. A growing evidence base testifies to the effectiveness of nonspecialist providers in facilitating management of a range of mental disorders, typically in primary care and community settings (van Ginneken et al., 2013).

Perhaps the strongest evidence base supports task sharing of psychological treatments among primary care workers, community health workers, and non-healthcare providers in the community (**EXHIBIT 10-4**). In Uganda, interpersonal therapy (IPT) was adapted so that it could be delivered by highly supervised lay

EXHIBIT 10-4 Do Talking Treatments Work in Low-Income Countries?

Things were already going pretty badly for Florence Manyande. Then one day last spring, while walking down the street, she was hit by a car.

"This woman saw, and she pulled me out of the road," recalls Manyande, 50. "She tried to talk to me, but I couldn't talk then. I had a lot on my mind."

Her run of bad luck had begun in 2010, when Manyande's husband skipped out on her and her three kids. "I had no way to pay school fees for my children," she says, and no way to pay rent. "Even my relatives were shunning me. They couldn't take me in because they said, 'We have our own problems.'"

By the time Manyande had her accident, she was thinking about killing herself.

Then her fortune took a turn. The woman who found her, injured, on the road happened to be a health worker. She took Manyande to the clinic to get bandaged up. "While I was there," Manyande says, "she introduced me to the 'Friendship Bench.'" (Singh, 2017)

There has been skepticism about the applicability of psychological treatments—such as cognitive-behavioral therapy (CBT), interpersonal therapy (IPT), and dialectical behavioral therapy (DBT)—for mental health problems in low-resource, non-Western cultural settings. Lack of clinical psychologists and different cultural belief systems have been seen as barriers to applying these psychological treatments. However, a rapidly growing evidence base suggests that lay persons can be trained and closely supervised to effectively deliver psychotherapies (Singla et al., 2017).

In developing the "Friendship Bench," Dixon Chibanda, a psychiatrist from Zimbabwe, adapted problem-solving therapy by integrating local cultural psychological concepts such as *kuvhura pfungwa* ("opening of the mind"), *kusimudzira* ("uplifting"), and *kusimbisa* ("strengthening"). Moreover, rather than focusing on psychiatric labels that could be stigmatizing, such as "depression" or "general anxiety disorder," the treatment employed culturally acceptable idioms of distress, such as *kufungisisa* ("thinking too much"). The intervention was delivered in a nonstigmatizing setting—a bench outside of health clinics, leading to the "Friendship Bench" name for the program.

Six months after receiving the Friendship Bench psychological intervention, only 13% of patients had depression, compared with 50% of persons in a basic treatment comparison group (Chibanda et al., 2016). Numerous other psychological treatments delivered by nonspecialists in LMICs—such as the Thinking Health Program, Healthy Activity Program, and Problem Management Plus (PM+)—have shown similar benefits. These interventions demonstrate both the effectiveness and the feasibility of psychotherapy for mood and anxiety disorders in settings that vary by culture and resource availability around the world.

community members for treatment of depression among war-affected adults and youth (Bolton et al., 2007; Bolton et al., 2003). Cognitive-behavioral therapy (CBT) was adapted for treatment of perinatal depression by female community health volunteers through the Thinking Healthy Program in Pakistan, which is now being replicated in diverse settings in LMICs (Rahman, Malik, Sikander, Roberts, & Creed, 2008). Behavioral activation has been adapted as a lay health worker–directed Healthy Activity Program for treatment of depression in India (Patel et al., 2017); Counseling for Alcohol Problems is a similar lay psychological treatment adapted from motivation interviewing for treatment of harmful alcohol use (Nadkarni et al., 2016). A Common Elements Treatment Approach (CETA) has also been developed so that closely supervised nonspecialists can provide trans-diagnostic care that incorporates elements from multiple psychological treatments (Murray et al., 2014). All of these nonspecialist interventions have demonstrated superiority to the usual treatments. In fact, when all nonspecialist psychological interventions for common mental disorders were reviewed (24 studies as of 2016), there was a pooled effect size of 0.49 (Singla et al., 2017), which approaches the effect sizes observed in psychological treatments delivered by specialists in high-income countries (Huhn et al., 2014).

In task sharing, nonspecialists take on detection, diagnosis, and management of health conditions in conjunction with training, supervision, and referral support by specialists (WHO, 2008). Thus, a key component of task sharing is the recognition that integration is not a simple matter of training nonspecialist health workers. A collaborative care delivery model, in which primary and community care practitioners work together with specialists, is an essential element for integrating mental health in primary care (Patel et al., 2013). Furthermore, primary care mental health services, although essential, cannot meet all of the mental health needs of any given population. This is especially true for people who are suffering from psychotic disorders and who need access to community mental health and rehabilitation programs, as well as emergency inpatient facilities (Patel, Farooq, & Thara, 2007).

Studies have explored the role of lay community health workers in primary and secondary prevention (Mutamba, van Ginneken, Smith Paintain, Wandiembe, & Schellenberg, 2013). For example, prevention studies in LMICs have shown that such interventions can reduce the burden of depression and PTSD in adults. Antenatal programs to prevent postpartum depression have led to improvements in other health outcomes related to children and mothers, such as mother–infant engagement (Rahman et al., 2013). There is also a growing evidence base on "early interventions," such as supportive psychotherapy and low-dose antipsychotic agents, that may delay or prevent progression to a first mental disorder episode (McGorry, 2015). Reducing the duration of untreated psychosis at the onset of schizophrenia can dramatically impact the life course of the illness (Fusar-Poli et al., 2009). This consideration is especially important in LMICs, where the duration of untreated psychosis can average two years, and it is not uncommon to go more than five years without initiating treatment (Thirthalli et al., 2011).

According to DCP-3 guidelines, at the healthcare level, hospital care is recommended as a best practice for delivery of MNS specialty services for severe, refractory, and emergency presentations of MNS disorders. In addition, mental health care should be integrated into other specialty services ranging from obstetric and gynecologic care to infectious diseases services to oncologic treatment.

Humanitarian Emergencies

Mental health services are especially important to address the acute and chronic needs of populations affected by complex humanitarian emergencies, such as war, environmental disasters, earthquakes, and other causes of forced displacement. Refugees, internally displaced persons, and other survivors of collective trauma are at an increased risk of MNS disorders. Unfortunately, populations affected by humanitarian emergencies live in settings where the health, and especially the mental health, services sector may have been limited or nonexistent even before the disaster. There is a heightened need to identify and allocate resources for providing mental health care and psychosocial support in these settings, both for those with disorders induced by the emergency and for those with preexisting disorders.

Guidance on mental health and psychosocial response is available through the Inter-Agency Standing Committee (IASC, 2007). WHO (2015) has also released a Humanitarian Intervention Guide version of mhGAP, which provides treatment recommendations for acute emergency response and includes trauma and grief-related conditions not covered in the basic mhGAP. In a number of countries, such emergencies have actually provided opportunities for systemic change or services reform in public mental health (WHO, 2013c).

Delivering Effective Treatments and Scale-up

Despite the evidence presented earlier, the fact remains that only a small proportion of people suffering from mental disorders receive effective interventions. This failure to provide effective treatments to all people who need them, which has been termed the "treatment gap," is evident in all countries, but is more marked in LMICs. Globally, only one in five people with depression in high-income countries receives minimally adequate treatment; however, the situation is far worse in lower-middle income countries, where only one in 27 people with depression receives minimally adequate care (Thornicroft et al., 2017).

Factors contributing to the treatment gap may be categorized as supply-side barriers and demand-side barriers. The supply-side barriers include lack of trained mental health workers, availability of culturally competent providers to address diverse ethnic and social groups, lack of transportation, and lack of affordable services. As mentioned earlier, there is a severe shortage of specialists in LMICs, where the bulk of the resources available for mental health services are devoted to large psychiatric hospitals and services are concentrated in a few urban settings (WHO, 2014)—this represents a major supply-side barrier in these countries. The demand-side barriers include lack of recognition among the public about mental disorders, lack of awareness that mental disorders can be treated, and stigma that prevents individuals from seeking care.

A challenge to implementing recommended prevention and treatment programs, as described in the DCP-3, is lack of political will—evidenced by less than 1% of the total health budget being allocated to MNS care in most national health systems. Similarly, less than 1% of development assistance goes toward MNS services. Given that 30% of the countries in Africa and 26% of countries in the Americas rank NGOs as the second major funding source for mental health care (WHO, 2015), it is clear that these development funds are stretched incredibly thin. In one out of five countries around the world, households

are the main source of funding for mental health care, mainly through direct out-of-pocket expenses and private health insurance coverage. Governments in Africa and the Americas are more likely to put the financial burden for such care on households. Additionally, health insurance in many countries specifically excludes or greatly restricts reimbursements for mental health care.

Even when government, employer, or private insurance policies do fund mental health care, there may not be *parity* with physical health services—that is, only a limited number of outpatient visits or inpatient treatment days may be covered by insurance. Mental health leaders from the United Kingdom, Canada, Australia, and New Zealand have led efforts to achieve parity in mental health care around the world (Royal College of Psychiatrists, 2012, 2013). In contrast, the United States has traditionally lagged behind other high-income countries, with major disparities being noted in coverage of mental health services compared to physical health: For outpatient services, 77% to 90% of plans place limits on mental health care that are not imposed on physical health care and 66% to 74% limit inpatient MNS services (Thalmayer, Friedman, Azocar, Harwood, & Ettner, 2017). The U.S. Mental Health Parity and Addiction Equity Act of 2008 required parity in insurers' coverage of mental health and physical health. In LMICs, recent national mental health policies in South Africa, India, and Liberia exemplify initiatives to increase government engagement in and support of mental health services.

Lack of financial investment in mental health services is related to high levels of stigma and lack of mental health literacy that lead to low demand from constituents, as well as lack of technical leadership to design and implement MNS treatment programs. Strategies for health-system strengthening include efforts in the following areas:

- To enact WHO's Comprehensive Mental Health Action Plan (WHO, 2013b); to adopt a mainstream rights-based perspective
- To update health policies, plans, and laws to be consistent with international human rights and standards, such as the United Nations' Convention on the Rights of Persons with Disability (UNCPRD)
- To address stigma and enhance mental health literacy to increase demand for care
- To increase advocacy by mental health service users
- To improve MNS services financing through diversion of taxes (alcohol, tobacco, marijuana), promotion of low-cost generic drugs, and de-implementation of harmful or ineffective treatments (e.g., benzodiazepines and vitamins in primary care)
- To include MNS disorders in health management information systems as national indicators

There have been a number of recent initiatives in implementation science to address both the mental health treatment gap and the efficacy–effectiveness gap. The Program for Improving Mental Health Care (PRIME) is integrating mental health services into primary and community care, based on WHO's mhGAP program, in South Africa, Uganda, Ethiopia, India, and Nepal. PRIME's objectives include developing packages of care for integration of mental health services into primary care, based on mhGAP; training primary care workers to deliver mental services; and advancing policy to create sustainable mental health services that can be scaled up from proof-of-concept districts to country-wide services (Lund et al., 2012). Emerging Mental Health Systems in Low- and Middle-Income Settings (EMERALD) is a six-country program (PRIME countries plus Nigeria) that addresses the gap in health systems' ability to scale up packages because of inadequate policy, human resources, funding, and infrastructure. Building on the work of PRIME, EMERALD's objectives include evaluating health-system inputs (e.g., resourcing with WHO's OneHealth tool, fair and sustainable financing), evaluating health-system processes (e.g., policy, legislation, governance, consumer participation), and evaluating health-system outputs (e.g., development, implementation, and monitoring of mental health indicators and performance) (Semrau et al., 2015). Another resource to support best practices in global mental health and advance from research to implementation is the Mental Health Innovation Network (MHIN; www.mhinnovation.net). These initiatives hold promise for addressing the needs of women, men, and children with mental disorders around the world. **EXHIBIT 10-5** outlines examples of national scaling-up in three countries across the spectrum of economic development.

Involving a range of sectors is a key aspect of responding to this call to action in all settings, and arguably even more so in LMICs, where formal mental healthcare systems are typically inadequately developed. Intersectoral, community-based action has been used to prevent alcohol and drug abuse and for rehabilitation models for schizophrenia. Another sector that has made important contributions to mental health care and reforms in high-income countries

EXHIBIT 10-5 Scaling Up Mental Health Initiatives

The "686 Project": China (Ma, 2012)

The "Central Government Support for the Local Management and Treatment of Severe Mental Disorders Project" was initiated in China in 2004 with a first financial allocation of 6.86 million renminbi ($829,000 in 2004 dollars). The program was subsequently referred to as the "686 Project." Modeled on WHO's recommended method for integrating hospital-based and community-based mental health services, this program provides care for a range of severe mental disorders through the delivery of a community-based packages by multidisciplinary teams. The interventions are functionally oriented, and are provided as free outpatient treatment through insurance coverage (New Rural Cooperative Medical Care system) and as subsidized inpatient treatment for poor patients. The program covered 30% of China's population by the end of 2011.

Program evaluation showed improved outcomes for the more than 280,000 registered patients. The proportion of patients with severe mental disorders who did not suffer a relapse for five years or longer increased from a baseline of 67% to 90%, and there were large reductions in the rates of "creating disturbances" and "causing serious accidents." The program investment by the government amounted to 280 million renminbi in 2011, and its key innovations were the increased availability of human resources, including both the involvement of non-mental health professionals and intensive capacity building; the latter has added one-third of all psychiatrists now working in China.

The National Depression Detection and Treatment Program: Chile (Alvarado & Rojas, 2011)

Programa Nacional de Diagnóstico y Tratamiento de la Depresión (The National Depression Detection and Treatment Program) is Chile's national mental health program that integrates detection and treatment of depression in primary care. The program is based on the scaling-up of an evidence-based collaborative stepped care intervention in which most patients diagnosed with depression are provided with medications and psychotherapy at primary care clinics, while only severe cases are referred to specialists. Launched in 2001, the program operates through a network of 500 primary care centers, and presently covers 50% of Chile's population. The program has added a large number of psychologists in the primary care system, with a 344% increase in the number of these providers occurring between 2003 and 2008. Enrollment of the patients in the program is growing steadily, with approximately 100,000 to 125,000 patients starting treatment each year from 2004 to 2006 and close to 170,000 patients starting treatment in 2007. Universal implementation of the program has led to a greater utilization by women and less-educated individuals, contributing to reduced health inequalities. The program's success can be attributed to the use of an evidence-based design that was made available to policy makers, teamwork, and proactive leadership, strategic alliances across sectors, sustained investment and ring-fencing of new and essential financial resources, program institutionalization, and sustained development of human resources that can implement the program.

Building Back Better: Burundi (WHO, 2013a)

Civil war in the last decade of the 20th century and the first decade of the 21st century resulted in widespread massacres and forceful migrations and internal displacement of approximately 1 million individuals in Burundi. To address this humanitarian crisis, Healthnet TPO (Transcultural Psychosocial Organization) started providing mental health services in Burundi during 2000, when the then Ministry of Public Health had no mental health policy, plan, or mental health unit, and when virtually all the psychiatric services in Burundi were provided by one psychiatric hospital. Healthnet TPO conducted a needs assessment first and then built a network of psychosocial and mental health services in communities in the national capital, Bujumbura, and in 7 of the country's 17 provinces. A new health worker cadre, consisting of psychosocial workers, played a pivotal role in delivery of these services.

Considerable progress has been made in the last decade, with the government now supplying essential psychiatric medications through its national drug distribution center, and outpatient mental health clinics being established in several provincial hospitals. From 2000 to 2008, more than 27,000 people were helped by the newly established mental health and psychosocial services. In the three years from 2006 to 2008, the mental health clinics in the provincial hospitals registered almost 10,000 people, who received more than 60,000 consultations. The majority (65%) were people with epilepsy.

In 2011, funding from the Dutch government enabled HealthNet TPO and the Burundian government to initiate a five-year project aimed at strengthening the country's health systems. One of the project's components is the integration of mental health care into primary care using WHO's mhGAP guidelines. The government has now established a National Commission for Mental Health, and appropriate steps are being taken to support provision of mental health care in general hospitals and follow-up within the community.

and has only recently achieved recognition in LMICs are consumer- and family-led movements. The World Fellowship for Schizophrenia and Allied Disorders and Alzheimer's Disease International are examples of NGOs that have their origins in high-income countries, where strong consumer movements led by families of persons with schizophrenia and Alzheimer's disease led to their establishment. In the past decade, both NGOs have established a growing presence in LMICs. Similarly, Befriender International, a voluntary group that provides support to persons who are suicidal, has spread to a number of LMICs. Local NGOs led by families of persons affected by mental disorders are also multiplying rapidly in LMICs. There are fewer examples of community movements that are led by persons who are themselves suffering from mental disorders. Perhaps the best example is Alcoholics Anonymous, which is widely represented internationally, and which is one of the most well-described examples of an effective community-based intervention for a mental disorder.

Advocacy to policy makers, the media, and other sectors in the health system is a core activity of these civil society organizations. Prominent examples of the success of these advocacy efforts include the inclusion of mental disabilities in the disability legislation passed by some countries. Many groups also provide services, usually in the form of support groups or networking for affected families, but the larger groups also support research activities and medical care. The Movement for Global Mental Health (mentioned earlier), which was launched in October 2008, took its inspiration from the global HIV/AIDS movements that have transformed HIV/AIDS care through a massive scaling-up of resources and services to provide a comprehensive continuum of care for people living with HIV (PLHIV) across the globe; the Movement is perhaps the largest global coalition of such civil society groups centered on mental health issues in existence.

One of the challenges going forward as part of scale-up of mental health services is empowering front-line health practitioners, along with considering how managers and administrators in governmental and nongovernmental health systems can make the leap into being active players in addressing gaps in mental health services. Clinical guidance, ranging from *Where There Is No Psychiatrist* (Patel & Hanlon, 2018) to the mhGAP second edition (WHO, 2016), seeks to empower health workers at any level of expertise to engage in mental health services provision. However, approaches are needed to synthesize lessons learned at the health organization and administration level. The DCP-3 focuses on MNS disorders and can help health system administrators determine the type and content of interventions across levels of care. For example, DCP-3 can guide administrators in determining which MNS conditions should be screened and at which level, as well as which types of pharmacologic and psychological interventions should be available at different health systems levels. The QualityRights Toolkit developed by WHO (2012) is another essential tool that can be used to assess health facilities and other social services institutions to assure human rights are protected and promoted in the delivery of mental health care. Case studies have been successfully used to identify common features for success and common challenges in implementing community mental health services in low-resource settings (Cohen et al., 2011).

Quality improvement tools that assess the fidelity of replicated interventions, competency of health workers, and outcomes and satisfaction among patients can also be used by health system administrators to guide implementation of mental health care services (Glisson & Williams, 2015). In Ethiopia, the Mental Health Services Satisfaction Scale (MHSSS) was developed as a self-report instrument for services users to evaluate interpersonal factors such as interactions with health workers, efficacy of treatment, communication within the health system, technical competency of providers, and adequacy of facilities (Mayston et al., 2017). This tool can be combined with community forums, which are government-established meetings for community members to provide feedback to local health facility workers. In Nepal, the Enhancing Assessment of Common Therapeutic Factors (ENACT) tool was developed as a way to rate nonspecialist health workers on basic mental health skills (Kohrt, Jordans, et al., 2015); it can be used by health administrators to determine when health workers have achieved sufficient competency to provide care and to guide supervision geared toward ongoing quality improvement. In Liberia, a combination of qualitative interviews and health facility infrastructure surveys have been used to determine health system preparedness for integration of mental health services into primary care (Gwaikolo, Kohrt, & Cooper, 2017). Based on PRIME's reception in sub-Saharan Africa and South Asia, a set of eight principles (**EXHIBIT 10-6**) have been identified for successful implementation of mental health services in community and primary-care settings (Davies & Lund, 2017).

EXHIBIT 10-6 Lessons for Integrating Mental Health into Primary Care in Low-Resource Settings

1. *Engage actively and collaboratively with local stakeholders.* Participatory methods involving health workers, health system administrators, ministry officials, community representatives, and mental health service users and family members are crucial to identify facilitators and barriers to successful implementation. Theory of Change (ToC) workshops are a methodology that have been developed and successfully implemented in global mental health to determine assumptions, interventions, and indicators for programs (Breuer et al., 2014).
2. *Use primary care systems to access vulnerable populations.* Health programs that have been successful in engaging vulnerable populations, such as pregnant women, orphan children, and persons with HIV, malaria, or tuberculosis, can be ideal platforms for the introduction of mental health services. Given the syndemic nature of comorbid physical and mental health problems and high-risk social environments, primary care be the entry point for comprehensive care models (Mendenhall, Kohrt, Norris, Ndetei, & Prabhakaran, 2017).
3. *Use cultural concepts of distress and narrative-based vignettes to identify persons with potential mental health problems.* Because of both the stigma and the lack of familiarity associated with biomedical psychiatric terminology, availability of treatment may not translate into engagement with treatment. The framing of psychoeducation and psychological and pharmacologic treatments around culturally salient ways of describing mental health problems can overcome the barriers associated with psychiatric terminology. An even more effective way to facilitate treatment engagement may be the use of culturally salient vignettes describing individuals with mental health problems. In Nepal, the Community Informant Detection Tool (CIDT) was developed to facilitate referrals by community stakeholders. Studies showed that more than two-thirds of individuals referred using the CIDT sought treatment, and the accuracy of the CIDT was better than screening tools such as the PHQ-9 (Jordans, Kohrt, Luitel, Komproe, & Lund, 2015; Jordans, Kohrt, Luitel, Lund, & Komproe, 2017).
4. *Use manual-based approaches to deliver care through nonspecialist health workers.* Extensive work in the field of global mental health has focused on adapting psychological and psychiatric treatment manuals for nonspecialist, cross-cultural audiences (Balaji et al., 2012). Some manuals even cater to providers with only basic literacy (Verdeli et al., 2003). Thoroughly adapted and piloted manuals can be used to optimize fidelity to evidence-based treatments. Increasingly, e-versions of manuals and intervention materials are being produced to facilitate delivery by nonspecialists (Zafar et al., 2016).
5. *Set up systems of ongoing supervision and support.* Training is inadequate in the absence of ongoing supervision when initiating mental health services in a new context. Supervision can be provided in person, via phone, or online by specialists and peers. Competency assessment tools and fidelity checklists can be used to identify key areas for remediation in supervision (Kohrt et al., 2015).
6. *Adequately compensate nonspecialist workers for their services.* For sustainability of mental health services, compensation of providers needs to be addressed. The PRIME program has evaluated the cost of scaling up services (Chisholm et al., 2016). When creating projections of costs, it is important to consider whether governments will fund providers rather than relying upon volunteer mental health workers.
7. *Respond to crises by "building back better."* Crises ranging from Ebola outbreaks in West Africa to earthquakes in Nepal have drawn attention to the inadequacy of LMICs' existing health systems to meet their populations' mental health needs. When international attention is drawn to the humanitarian emergencies, it can be an opportunity to make sustainable changes. For example, the earthquake in Nepal contributed to a reexamination of that government's essential drugs list, which was still relying on half-century-old classes of psychiatry medications with high side-effect burdens. Through a combination of international NGO funding, local NGO advocacy, and expertise from local psychiatrists, the government revised the psychiatric medications list.
8. *Make use of policy windows.* In South Africa, pilot implementation of mental health services as part of primary care was conducted in a district that was also a national pilot site for the planned national health insurance reforms. In another district in South Africa, the department of health was launching an initiative titled the "First 1000 Days" to promote maternal and child health and education. Mental health researchers then selected this district to promote and initiate maternal mental health interventions in routine maternal health services.

Modified from Davies, T., & Lund, C. (2017). Integrating mental health care into primary care systems in low- and middle-income countries: Lessons from PRIME and AFFIRM. *Global Mental Health, 4*, e7.

Global Mental Health: Looking Ahead

Ten years on from the first *The Lancet* series that propelled mental health into the global health spotlight, it is time to consider where the field should head in the next decade. It is evident that, while the existing agenda to improve access to care is still very far from being attained (e.g., treatment gaps remain very large in all countries), this alone is unlikely to lead to a measurable impact not only in reducing the treatment gap but ultimately in reducing the global burden of mental disorders. In this section, we outline research priorities for global mental health to tackle these needs, and then we conclude with an agenda to address key challenges in the field.

Research Priorities in Global Mental Health

Research priorities in global mental health are continuously evolving and reflect national and global policies, funders and their priorities, public attention to health issues, advocacy from human rights and service users' groups, and other trends in national and global health. There have been recent inflection points in the development of global mental health research priorities. Notably, the group of scholars who produced the 2007 *The Lancet* Global Mental Health series conducted a priority-setting exercise to identify the top 10 mental health research questions (Tomlinson et al., 2009). The resulting priority questions were related to health policy and systems research, where and how to deliver existing cost-effective interventions in a low-resource context, and epidemiologic research on the broad categories of child and adolescent mental disorders or those pertaining to alcohol and drug abuse.

A priority-setting activity for the Global Forum identified priorities among researchers and stakeholders in LMICs (Sharan et al., 2009). Priorities included determining the burden of MNS disorders, identification of risk factors, and studying health systems. Prioritized disorders were depression and anxiety, substance use disorders, and psychoses. Prioritized populations were children and adolescents, women, and persons exposed to violence and trauma. Social sciences methods have also been recommended to complement epidemiologic and intervention studies (Kohrt, Mendenhall, & Brown, 2016).

As mentioned at the beginning of the chapter, the Grand Challenges in Global Mental Health (Collins et al., 2011) include a range of research priorities, with an emphasis on implementation science (**TABLE 10-8**). A priority-setting activity was conducted for mental health and psychosocial support research in humanitarian settings (Tol et al., 2011). This exercise yielded key questions to be addressed in global mental health, including identifying stressors faced by populations in humanitarian settings, determining methods to assess mental health in humanitarian settings, documenting how affected populations describe mental health, selecting indicators for monitoring and evaluation, adapting interventions to different sociocultural settings, and determining the effectiveness of family- and school-based preventive interventions.

Emerging research priorities in global mental health include enhancing our understanding of mental health problems through global representation of populations in basic science and neuroscience research (Stein et al., 2015). Because neuroscience models of mental health are dominated by research in WEIRD populations (Henrich, Heine, & Norenzayan, 2010a, 2010b), generalizability of these models to LMIC populations is limited and the progress in understanding the nature of mental health problems has been slow. This is especially problematic when these neuroscience mechanisms are selected as the prioritized targets for intervention before confirmation of similar processes in populations with different child developmental histories, different socioeconomic conditions, and different genetic admixtures (Kirmayer & Gold, 2012a). Nevertheless, potential synergies exist between global mental health and clinical neuroscience research priorities, such as development of reliable criteria for diagnosis of schizophrenia across populations and contexts, understanding responses to trauma and adversity including early-life adversity, understanding resilience across contexts, and development of interventions for nonspecialist providers and preventive measures for resilience promotion (Stein et al., 2015).

As in other areas of global health, there is increasing interest in the application of digital technology and mHealth to increase the delivery, accessibility, and effectiveness of mental health services. In global mental health, digital technologies have been predominantly used in the domains of supporting clinical care and educating health workers, facilitating diagnosis and detection of mental disorders, promoting treatment adherence, and supporting recovery, online self-help, and programs for substance misuse prevention and treatment (Naslund et al., 2017). To date, however, there has been limited research into the effectiveness of these approaches, and data are lacking for both clinical outcomes and cost–benefit analyses of digital technologies compared to traditional approaches. The

TABLE 10-8 Grand Challenges for MNS Disorders

	Top 25 Challenges	Illustrative Research Questions
Goal A: Identify root causes, risk, and protective factors	▪ Identify modifiable social and biological risk factors across the life course ▪ Understand the impact of poverty, violence, war, migration, and disaster ▪ Identify biomarkers	▪ What is the relationship between early fetal and child development and the onset of MNS disorders? ▪ What are the phenotypes and endophenotypes of MNS disorders across cultural settings? ▪ Which gene environment interactions are associated with increased risk for mental disorders? ▪ Which factors promote resilience and prevent mental disorders in persons at extreme social disadvantage? ▪ What role does social context play in the persistence of MNS disorders throughout life?
Goal B: Advance prevention and implementation of early interventions	▪ Support community environments that promote physical and mental well-being throughout life ▪ Reduce the duration of untreated illness by developing culturally sensitive early interventions across settings ▪ Develop interventions to reduce the long-term negative impact of low childhood socioeconomic status on cognitive ability and mental health ▪ Develop an evidence-based set of primary prevention interventions for a range of MNS disorders ▪ Develop locally appropriate strategies to eliminate childhood abuse and enhance child protection	▪ Which behavioral skills can enhance executive function, resilience, and cognitive flexibility throughout life? ▪ Which neuroprotective agents and/or cognitive retraining paradigms can be used during the period of rapid brain development to reduce vulnerability to disorders in adolescence? ▪ How effective are home- and school-based interventions for child abuse and neglect?
Goal C: Improve treatments and expand access to care	▪ **Integrate screening and core packages of services into routine primary health care** ▪ **Reduce the cost and improve the supply of effective medications** ▪ Develop effective treatments for use by nonspecialists, including lay health workers with minimal training ▪ Incorporate functional impairment and disability into assessment ▪ **Provide effective and affordable community-based care and rehabilitation** ▪ **Improve children's access to evidence-based care by trained health providers in LMICs** ▪ Develop mobile and information technologies (such as telemedicine) to increase access to evidence-based care	▪ How effective are brief screening tools for the detection of MNS disorders in routine care settings? ▪ How effective are interventions for serious mental disorders delivered by lay health workers? ▪ How will increased understanding of neural circuits lead to alternatives to current pharmacologic interventions? ▪ How can mobile-phone technology be used to monitor seizure frequency? ▪ How can video games and other electronic media be used for cognitive remediation across cultural settings? ▪ Which psychosocial interventions produce the best outcomes for community-based care for MNS disorders across cultural settings?

Goal D: Raise awareness of the global burden of mental health disorders	▪ Develop culturally informed methods to eliminate the stigma, discrimination, and social exclusion of patients and families across cultural settings ▪ Establish cross-national evidence on the cultural, socioeconomic, and services factors underlying disparities in incidence, diagnosis, treatment, and outcomes ▪ Develop valid and reliable definitions, models, and measurement tools for quantitative assessment at the individual and population levels for use across cultures and settings ▪ Establish shared, standardized global data systems for collecting surveillance data on the prevalence, treatment patterns, and availability of human resources and services	▪ What are the components of effective interventions to reduce stigma associated with MNS disorders? ▪ Which interventions to reduce stigma and discrimination can be targeted to and implemented in health and social services settings in different health-system environments? ▪ What is the impact of macroeconomic factors (such as unemployment rates, international trade, national income) on the prevalence of MNS disorders over time? ▪ What is the impact of policy initiatives on the coverage of treatment for MNS disorders? ▪ Which measurement factors contribute to differences in the prevalence of mental disorders across ethnic groups within and between countries?
Goal E: Build human resources capacity	▪ Increase capacity in LMICs by creating regional centers for mental health research, education, training, and practice that incorporate the views and needs of local people ▪ Develop sustainable models to train and increase the number of culturally and ethnically diverse lay and specialist providers to deliver evidence-based services ▪ **Strengthen the mental health component in the training of all healthcare personnel**	▪ What is the most effective way to train primary healthcare workers to deliver evidence-based care with adequate fidelity to guidelines? ▪ What is the comparative effectiveness of care for MNS disorders by different cadres of healthcare providers? ▪ What are the views of low-income communities in high- and low-income countries on the priority research questions for MNS disorders?
Goal F: Transform health-system and policy responses	▪ Establish and implement minimum healthcare standards for MNS disorders around the world ▪ Redesign health systems to integrate MNS disorders with other chronic-disease care, and create parity between mental and physical illnesses in regard to investments into research, training, treatment, and prevention ▪ Incorporate a mental health component into international aid and development programs	▪ What can we learn from different approaches (and associated costs) to integrated delivery of care across health systems? ▪ What are the most effective health-system-wide strategies to reduce consumption of alcohol and illicit drugs? ▪ What is the impact of legislation that ensures parity between mental and other illnesses on access to mental health services?
Summary principles	▪ Use a life-course approach to study ▪ Use system-wide approaches to address suffering	▪ Use evidence-based interventions ▪ Understand environmental influences

Note: **Bold type** denotes the top five challenges ranked by disease-burden reduction, impact on equity, immediacy of impact, and feasibility.
Modified from Collins, P. Y., Patel, V., Joestl, S., March, D., Insel, T. R., Daar, A. S. (2011). Grand challenges in global mental health. *Nature, 475*, 27–30.

abundance of studies focusing on digital technology that are currently in the research pipeline will likely transform the landscape of how mental health is studied, prevented, and treated in the coming decade.

With a focus on technological advances in methods and interventions through neuroscience and mobile innovations, it is important not to overlook important research priorities that have a major impact on the human rights and quality of life of persons with mental illness. Though the drive toward community mental health is certainly appropriate, there is a risk that the role and quality of inpatient and residential facilities might be overlooked in the haste to move services into outpatient settings. The focus on community services may falsely imply that such services can handle all possible cases and institutional services are not needed, or that there are appropriate facilities to which emergencies can be referred. Unfortunately, neither presumption is true. Physical restraint, such as chaining people in homes or to trees, is all too often the only option left to families and religious leaders when higher-level care services are not available in LMICs (Asher et al., 2017; Minas & Diatri, 2008). Research on the appropriate role of institutions in the protection and care of persons with mental illness is a major gap in global mental health initiatives.

Finally, a re-envisioning of mental health and economic development research priorities is needed. If we are to align global mental health with current international sustainable development policy (as formulated in the SDGs), then we need to demonstrate not only that providing mental health interventions (SDG3) can reduce the global burden of disease, but also that the SDGs have the potential to improve population mental health by addressing the social and economic determinants of mental health. Achieving this outcome requires a research agenda focused on the social determinants of mental health, such as elucidating the mechanisms by which social and economic conditions determine mental health across the life course, and generating evidence of interventions that might address the upstream risk factors for mental illness. This means linking mental health interventions to broader development agendas, particularly those focusing on poverty, violence, migration, and gender. In this context, mental health studies would need to demonstrate outcomes that go beyond mental health, such as reductions in violence and improvements in economic circumstances. Linking mental health care with other development interventions to demonstrate interaction effects could be very beneficial for showing the added value of including mental health services in broader development initiatives. This requires a focus on certain developmental phases, such as early childhood development and adolescence, that are critical periods for neurological development and neuroplasticity. Given the plasticity and associated vulnerability of these periods, interventions need to be tailored to adolescents according to their level of deprivation or trauma exposure. Studies that demonstrate awareness of this factor—for example, through flexible, tailored, multicomponent interventions—could capitalize on this developmental stage to optimize those interventions' clinical benefits and cost-effectiveness and to extend the longevity of positive benefits.

A Global Mental Health Agenda for the Next Decade

A number of barriers have prevented the transformation of the large body of science into actions, both at the global and local levels, and particularly in LMICs (Saraceno et al., 2007); these pose systemic and systematic threats that need to be acknowledged and addressed explicitly if we are to see radical change in the future.

First, compared to the experiences of other global health movements (e.g., HIV/AIDS and maternal and child health), advocacy for mental health has been hampered by the reliance on process indicators (e.g., increasing coverage of services) rather than outcome indicators (e.g., improved mental health). This orientation may cause reluctance among health authorities to support and prioritize mental health (WHO, 2003a; Howes, 2005).

Second, fragmentation of the advocacy by diverse constituencies and science from diverse disciplinary traditions poses a challenge. For example, approaches to mental health issues range from the happiness agenda promoted by economists, to the specialist care for mental disorders promoted by clinical professionals, to the quest to fight discrimination promoted by civil society activists, to the ventures related to mapping the human brain promoted by neuroscientists. This leads to contradictory messages being sent to governments by the diverse stakeholders concerned with mental health and may leave critical questions unanswered. For example, should we focus more on addressing social determinants or biomedical treatment? Do we need (and want) more or less hospital beds? Should we promote new-generation, more expensive drugs, or cheaper, older-generation agents?

Third, there has been an alienation of the mental health professional communities from the vision of global mental health. While reforms of mental health services from institutions led by psychiatrists and team-based approaches oriented to primary and community

care have been unanimously supported by many constituencies, they have been opposed, at times, by powerful national groups of psychiatrists and other mental health professionals. This opposition also risks derailing the process of reforming psychiatric institutions and, consequently, may prevent improvements in quality of care and greater respect for and enhancement of the human rights of people with mental disability. This resistance is problematic, because innovations in care delivery at all levels of the health system cannot happen without the full participation and support of psychiatrists and nurses (Berlin, 1969; Fisch, 1965; Johansson, Astrom, Kauffeldt, Helldin, & Carlstrom, 2014).

Fourth, there is the risk of global mental health becoming yet another silo, unlinked to other momentous initiatives in global health, such as Every Woman Every Child or Universal Health Care. This risk is exemplified by the lack of adequate engagement with mental health in the curricula of general health professionals and the continuing emphasis in psychiatric training on biomedical aspects of mental health, while often ignoring the important contributions coming from the social sciences and global health (Hilty et al., 2006; Lobo, de-la-Camara, Campos, & Saz, 2015; Wynaden, Orb, McGowan, & Downie, 2000).

The future requires a reimagining of the existing agenda of global mental health in a number of significant ways. First, the scope should be global, addressing concerns that are relevant in all countries. Indeed, as far as mental health is concerned, it would be fair to say that all countries are "developing" to one degree or another. Second, we must acknowledge that the biomedical approach to binary categories of diagnoses of mental disorders, while of utility to health workers, does not accurately reflect the multidimensional nature of mental health, and recommend a staged model in its stead (Patel, 2017). The theoretical framework underpinning this vision is that of the continuum of mental health spans from well-being to disability and health to ill health. Third, to emphasize a convergent model of mental health, we must recognize the complex interplay of environmental, biological, and developmental factors across the life course, from conception to the grave, across generations and genders. Finally, the global community must recognize mental health as a basic human right for all peoples, albeit with a specific focus on those who face the gravest danger of their rights being denied, such as populations living in institutions or facing severe social adversity.

Today, we have a historic opportunity to reimagine the global mental health agenda in light of the broader perception of mental health as an integral part of the SDGs, as envisioned in WHO's Comprehensive Mental Health Action Plan. There was a call for greater investment in mental health in the landmark summit hosted jointly by the World Bank and WHO in Washington, D.C., in April 2016. This call has been accompanied by explicit acknowledgment of mental health as a global development issue, the potential for a grand convergence of science across disciplines, and growing consensus between stakeholders. Improvements in mental health hold the potential to contribute to enhanced sustainable development and the improvement of people's lives. Indeed, the aging of populations across the world, and trauma and displacement consequent to conflict and climate change, are among the great social challenges of our time, and these translate into greater demand in society for higher-quality services as well as for greater social support for disability and elder care—areas where mental health care looms large. Over and above these concerns, the clearly evident effects of climate change, poverty, and inequality on mental health add urgency to the calls for broader social and economic transformation, and for a more equitable and sustainable world order.

In summary, there is an urgent need for a significant expansion of the agenda of global mental health, building on its achievements while also recognizing the limitations of its extant principles and strategies, by seeking to incorporate novel understandings of mental health and the alignment of mental health with the SDGs. At the heart of this reimagining of global mental health is a reframing of the goals of global mental health, from reducing the treatment gap for people affected by mental disorders to the more ambitious aim of enhancing the mental health of populations and reducing the actual global burden of mental disorders. Realizing this vision will require combined actions of promotion of population mental health, prevention of mental disorders, and effective medical and social care for people with mental disorders.

Discussion Questions

1. It is difficult to place mental health high on the public health agendas of LMICs that face an enormous burden from communicable diseases. Which evidence-based arguments might you make to challenge the notion that mental health is a luxury item on the health agendas of such countries?
2. The classification of mental disorders is mainly derived from the description of these disorders in high-income countries. Some argue that this fact limits the application of psychiatric knowledge and evidence to non-Western cultures.

How valid are these concerns? In which ways has the "Western" bias been addressed in classification of mental disorders in international public health?

3. Diseases that disproportionately affect the poor are typically prioritized by governments and donors. Some people believe that disorders such as depression are problems of the middle class and the affluent, or represent a "medicalization of misery," and, therefore, do not deserve a share of scarce resources. What is the evidence linking poverty with mental disorders? How might poverty interact with mental health?
4. While there is now a growing evidence base on effective treatments for most mental disorders, large treatment gaps can be found in all countries, especially in LMICs. What are the reasons for this treatment gap? How can they be addressed at the level of health policy and health service development?
5. Human rights are a major driver in global health. Even though people affected by mental disorders represent one of the most marginalized and discriminated groups in any context, their human rights are often ignored. Why is this the case, and what can be done to address this issue?

References

Aben, I., Lodder, J., Honig, A., Lousberg, R., Boreas, A., & Verhey, F. (2006). Focal or generalized vascular brain damage and vulnerability to depression after stroke: A 1-year prospective follow-up study. *International Psychogeriatrics, 18*(1), 19–35.

Alem, A. (2002). Community-based vs. hospital-based mental health care: The case of Africa. *World Psychiatry, 1*(2), 98.

Alem, A., Jacobsson, L., & Hanlon, C. (2008). Community-based mental health care in Africa: Mental health workers' views. *World Psychiatry, 7*(1), 54–57.

Alvarado, R., & Rojas, G. (2011). El programa nacional para el diagnóstico y tratamiento de depresión en atención primaria: una evaluación necesaria. *Revista médica de Chile, 139,* 592–599

Alzheimer's Disease International. (2015). *World Alzheimer report 2015: The global impact of dementia.* London, UK: Author.

American Psychiatric Association (APA). (1980). *Diagnostic and statistical manual of mental disorders* (3rd ed). Washington, DC: Author.

American Psychiatric Association (APA). (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: American Psychiatric Publishers.

Anda, R. F., Felitti, V. J., Bremner, J. D., Walker, J. D., Whitfield, C., Perry, B. D., . . . Giles, W. H. (2006). The enduring effects of abuse and related adverse experiences in childhood: A convergence of evidence from neurobiology and epidemiology. *European Archives of Psychiatry & Clinical Neuroscience, 256*(3), 174–186.

Anderson, I., Robson, B., Connolly, M., Al-Yaman, F., Bjertness, E., King, A., . . . Yap, L. (2016). Indigenous and tribal peoples' health (*The Lancet*–Lowitja Institute Global Collaboration): A population study. *The Lancet, 388*(10040), 131–157. doi:10.1016/S0140-6736(16)00345-7

Andreoli, S. B., Almeida-Filho, N., Martin, D., Mateus, M. D. M., & Mari, J. d. J. (2007). Is psychiatric reform a strategy for reducing the mental health budget? The case of Brazil. *Revista Brasileira de Psiquiatria, 29*(1), 43–46.

Asher, L., Fekadu, A., Teferra, S., De Silva, M., Pathare, S., & Hanlon, C. (2017). "I cry every day and night, I have my son tied in chains": Physical restraint of people with schizophrenia in community settings in Ethiopia. *Globalization and Health, 13*(1), 47. doi:10.1186/s12992-017-0273-1

Balaji, M., Chatterjee, S., Koschorke, M., Rangaswamy, T., Chavan, A., Dabholkar, H., . . . Patel, V. (2012). The development of a lay health worker delivered collaborative community based intervention for people with schizophrenia in India. *BMC Health Services Research, 12,* 42. doi:http://dx.doi.org/10.1186/1472-6963-12-42

Barry, M. M., Clarke, A. M., Jenkins, R., & Patel, V. (2013). A systematic review of the effectiveness of mental health promotion interventions for young people in low and middle income countries. *BMC Public Health, 13*(1), 835. doi:10.1186/1471-2458-13-835

Basu, S. (2016). Madras lunatic asylum: A remarkable history in British India. *Indian Journal of History of Science, 51,* 478–493.

Baxter, A., Scott, K., Vos, T., & Whiteford, H. (2013). Global prevalence of anxiety disorders: A systematic review and meta-regression *Psychological Medicine, 43,* 897–910.

Baxter, A. J., Vos, T., Scott, K. M., Ferrari, A. J., & Whiteford, H. A. (2014). The global burden of anxiety disorders in 2010. *Psychological Medicine, 44*(11), 2363–2374. doi:10.1017/S0033291713003243

Becker, A. E., Burwell, R. A., Gilman, S. E., Herzog, D. B., & Hamburg, P. (2002). Disordered eating behaviors and attitudes follow prolonged exposure to television among ethnic Fijian adolescent girls. *British Journal of Psychiatry, 180,* 509–514.

Bell, C., Williamson, J., & Chien, P. (2008). Cultural, racial and ethnic competence and psychiatric diagnosis. *Ethnicity and Inequalities in Health and Social Care, 1*(1), 34–41.

Berlin, I. N. (1969). Resistance to change in mental health professionals. *American Journal of Orthopsychiatry, 39*(1), 109–115.

Bilder, R. M. (2015). Dimensional and categorical approaches to mental illness: Let biology decide. In L. J. Kirmayer, R. Lemelson, & C. A. Cummings (Eds.), *Re-visioning psychiatry: Cultural phenomenology, critical neuroscience, and global mental health* (pp. 179–205). New York, NY: Cambridge University Press.

Björkenstam, E., Ljung, R., Burström, B., Mittendorfer-Rutz, E., Hallqvist, J., & Weitoft, G. R. (2012). Quality of medical care and excess mortality in psychiatric patients: A nationwide register-based study in Sweden. *BMJ Open, 2*(1). doi:10.1136/bmjopen-2011-000778

Blacker, D., & Tsuang, M. T. (1992). Contested boundaries of bipolar disorder. *American Journal of Psychiatry, 149*(11), 1473–1483.

CHAPTER 21

Global Health Governance and Diplomacy

Kelley Lee

Introduction

There is wide-ranging evidence that human societies worldwide, along with the natural environment, are being fundamentally altered by processes collectively referred to as globalization. Although globalization has been unfolding for many centuries, if not longer, it is broadly recognized that the changes occurring since the late 20th century have been faster paced, farther reaching, and more profound in their impacts (Beck, 2015; Scholte, 2005; Stiglitz, 2007).

Within the public health community, understanding of globalization and its population health consequences has led to a shift in attention from *international* health to *global* health. Many of the chapters in this text concern the direct impacts of globalization on public health. For example, there is clear evidence of new patterns of communicable disease outbreaks since 1980, including a four-fold increase in their number and a 20% rise in the specific types of diseases causing them (Smith et al., 2014). Similarly, a shifting and growing burden from noncommunicable diseases (NCDs) is rapidly emerging in populations across the world (see the *Chronic Diseases and Risks* chapter). These new epidemiologic patterns have created a "double burden" in many countries, as they struggle to cope with both communicable and noncommunicable diseases, as well as new distributions of health and disease for populations that cut across national borders (Lewis & MacPherson, 2013; World Health Organization [WHO], 2009).

The need to better understand how globalization is affecting population health has, in turn, opened up new avenues of inquiry and action. Foremost are renewed efforts to identify and explain the social determinants of health related to globalization, such as changes in the world economy, patterns of migration, changes to natural and human-built environments, and trends in human conflict. There is now a thriving body of scholarship conceptualizing and empirically demonstrating these complex linkages between globalization and population health as a precursor to strengthening public health policies (Huynen, Martens, & Hilderink, 2005; Labonte & Schrecker, 2007; Martens, Akin, Maud, & Mohsin, 2010). Overall, global health research, policy, and practice have made significant advances since the late 1990s, with key areas of focus being diagnoses of the changing public health problems faced and the likely causes posed by globalization (Birn, Pillay, & Holtz, 2017).

Alongside this growing evidence of the direct impacts of globalization, and awareness of the linkages between the social determinants of health and

globalization, there have been efforts to understand the collective actions needed to better protect and promote population health in a globalizing world. What should be the agreed and shared responses by societies to the health impacts of globalization? How can these responses be best achieved within and across societies?

This chapter is about the forms of collective action needed to address public health issues arising from globalization, broadly known as global health governance (GHG), and the best ways to achieve them. GHG concerns the institutional arrangements—in the form of rules, responsibilities, and processes—for achieving agreed goals related to global health needs. This chapter begins by briefly setting out clear definitions for two concepts underlying GHG: globalization and global health. While widely used, these terms are often poorly defined, which in turn contributes to confusion regarding the needed scope and nature of collective action. Not all changes taking place since the late 20th century have been due to globalization. Not all public health issues are global in nature. Moreover, while globalization is having profound impacts on a vast array of health determinants and outcomes, not all public health issues require GHG. A clear understanding of these concepts, therefore, helps to define the parameters of this chapter.

Focusing on GHG, this chapter then describes the existing institutional arrangements that structure collective responses to global health needs. These arrangements are located within a historical background of international health cooperation, established after World War II, as well as contemporary efforts to transition to new arrangements that enable new forms of collective action. This discussion includes the limitations of existing institutions, in terms of governance gaps. In this context, global health diplomacy (GHD) is understood as a key feature of GHG. GHD concerns emerging processes of political negotiation and consensus building that enable the creation of the institutional arrangements needed for GHG.

Finally, this chapter reviews the enduring challenges faced by the global health community in strengthening GHG. These challenges stem from the diverse interests, ideas, and institutions shaping global health and the invariably political nature of governance. Importantly, these challenges are not intractable. The changing context within which GHD takes place, including the changing roles of particular state and non-state actors, brings new opportunities. The chapter concludes by discussing ways that institutional innovation is beginning to facilitate the transition from international to global health governance. This paradigm change requires the global health community to navigate between longstanding efforts to reform the World Health Organization, which have yielded limited success, and the creation of an entirely new institutional architecture, which has been hindered by a lack of political consensus on what this structure should look like.

Globalization and Global Health Needs

The widely used term "globalization" articulates a shared sense that the contemporary world, beginning in the last decades of the 20th century, has become more interconnected, with events in one part of the world having potentially far-reaching consequences elsewhere. This phenomenon has spawned a vast and multidisciplinary scholarly literature, spanning the natural and applied sciences, social sciences, arts, and humanities, characterized by diverse theoretical perspectives, normative frameworks, and empirical debates about whether globalization is really happening, what the key drivers are, and, perhaps most controversially, whether it is having positive or negative impacts on human societies and the natural world.

It is beyond the scope of this chapter to review this substantial and diverse literature with its many points of contestation. At the same time, if we are to understand the collective action needed to manage the health impacts of globalization, a clear and shared understanding of the nature of the changes occurring, as a distinct phenomenon, is an essential starting point. To achieve this goal, we can begin by locating globalization within a historical context.

Although the "globalization" term has been coined relatively recently, contemporary shifts can be linked to social changes over the course of centuries, if not millennia. The earliest beginnings of globalization can be traced to the migration of *Homo erectus* out of the African continent 1 million years ago, or perhaps more specific to modern humans, the migration of *Homo sapiens* around 80,000 years ago. The latter hominids eventually colonized much of the planet, forming societies that interacted with other societies across ever-increasing distances and with greater frequency. Globalization, in this historical sense, can be understood as a continuum from lesser to greater social formation and integration across societies over time. Earliest human societies were circumscribed in membership and territory, infrequently interacting with each other, and often competing for available resources. Over time, the invention and use of new modes of transportation (from horse-drawn carts to ships and railroads and then cars and airplanes) and

communication (from papyrus scrolls to telegraphy to the Internet) enabled people to connect across greater distances in ever-larger numbers. Social, political, and economic history is correspondingly marked by events denoting this gradual interconnectedness of human societies—the opening of the Silk Road between Asia and Europe, the arrival of Christopher Columbus in the Americas, the formation of the modern state system, the colonial empires of European powers, the establishment of the slave trade, and the Industrial Revolution. Characterizing all of these developments was the increased mobility of people (voluntary or otherwise) and other life forms (plants and animals); flows of capital, goods, and services; and dissemination and exchange of knowledge and ideas. Thus, what many refer to as contemporary globalization can be understood as the acceleration and intensification of a historical process resulting in even more frequent and deeper interactions across human societies.

Yet, while globalization can be understood as a historical process, it is also necessary to identify what is distinct about the term. The work of Jan Aarte Scholte (2008) is helpful in this respect. Scholte begins by arguing that the term "globalization" is often used when people really mean something else. He identifies this "something else" to be several existing terms—internationalization, liberalization, universalization, and Westernization—that are not synonymous with globalization, but rather "redundant concepts of globalization." Each of these terms already has an existing and particular meaning:

- *Internationalization.* This is the most commonly used meaning attached to the term "globalization," referring to the process of closer interaction and exchange between people located in different countries. Various cross-border measures, such as trade and investment, communications, and migration, are cited as evidence of the increase in exchanges across national borders. Because the focus of these interactions and exchanges is how they occur across countries (or nations), the term "internationalization" is the appropriate term. Historically, since the establishment of the international system of sovereign states some 500 years ago, there have been a growing scope and frequency of economic, political, and social connections across groups of two or more countries.
- *Liberalization.* This is another commonly used meaning attached to "globalization." Liberalization concerns the process, in a world composed of sovereign states, of lessening government "regulatory barriers to transfers of resources between countries." Historically, the various rounds of negotiations under the General Agreement on Tariffs and Trade (GATT), spanning from the end of World War II to 1995 and including the creation of the World Trade Organization (WTO), led to successive reductions in trade tariffs. The continuation of this process since the mid-1990s, under multilateral, regional, and bilateral trade and investment agreements, has frequently been referred to as globalization. However, Scholte argues that the term "liberalization" is more accurate, with "little need now to invent a new vocabulary for this old phenomenon."
- *Universalization.* This term, which refers to the process of a social phenomenon spreading to all parts of the world, is often the intended meaning of "globalization" for some users of this term. When defined in this way, however, it might be argued that many examples of universalization predate globalization. Several world religions, for example, have won followers worldwide over the centuries. In this sense, Scholte argues that the term "universalization" is deemed adequate.
- *Westernization.* This term describes the process by which culture, values, ideas, and behaviors characteristic of Western societies, and particularly American society, are increasingly adopted in other countries worldwide. In this sense, globalization refers to a largely negative process of cultural colonization, and even homogenization, through a steady diet of American media, fashion, language, and consumer products. Although it is undoubtedly the case that Westernization is taking place, Scholte (2008) argues that "intercontinental westernization . . . has unfolded since long before the recent emergence of globe-talk." He suggests that the concepts of modernization and imperialism readily capture the ideas of Westernization and "[w]e do not need a new vocabulary of globalization to remake an old analysis."

Scholte (2008) casts aside these "redundant" terms and reserves the term "globalization" to describe social phenomena that do not simply cross national borders, but rather transcend them. Only when territorial boundaries, based on physical geography, are circumvented or become irrelevant can we speak of globalization. Satellite communications, climate change, social media, illicit drug trafficking, and undocumented migration are examples of globalization in this strict sense. It is this strict definition of globalization, as the accelerated transcendence of territorial boundaries, that distinguishes the changes being experienced across human societies since the late 20th century.

Thus, globalization is a historical process characterized by changes in the nature of human interaction across a range of social spheres, including the economic, political, technological, cultural, and environmental arenas. These changes are globalizing in the sense that boundaries hitherto separating us from each other are being transformed. These boundaries—spatial, temporal, and cognitive—can be described as the dimensions of globalization. Briefly, the spatial dimension concerns changes in how we perceive and experience physical space or geographical territory, the temporal dimension concerns changes in how we perceive and experience time, and the cognitive dimension concerns changes in how we think about ourselves and the world around us (Lee, 2003).

The loose and varied uses of the term "globalization" in public health have led to similar imprecision in the application of the term "global health." The diverse definitions of global health, in tandem with its prevalent use, risk rendering this term meaningless. Although such definitions abound, many lack conceptual rigor. As a result, the term "global health" is also now associated with a broad range of other meanings. Some are redundant, given preexisting terms with the same meaning, such as health cooperation between governments (international health) or health in low- and middle-income countries (LMICs) (health development). Others are based on seeing the world from a self-centric (largely Western) viewpoint, such that domestic health issues in one's home country are considered separate from those of all other countries. The problem with adopting this perspective, in which "global" is viewed as everywhere but home, is that global health becomes completely relative. Moreover, this view supports the "othering" of nondomestic populations, and overlooks the key defining feature of globalization—namely, the closer linkages and interconnections among populations across territorial space. Other definitions focus on normative goals such as reducing differences in health status or distribution of health determinants caused by an increasingly globalized world (health inequalities) or the systematic, socially produced and unfair causes of health inequalities (health inequities). Thus, the understanding of the term "global health" can depend as much on normative frameworks and aspirations as it does material reality.

In sum, "global health" has become an umbrella term, subsuming previously used terms describing existing health needs, as well as embracing emerging kinds of health issues arising from contemporary globalization. It is important to recognize and interrogate these varying definitions as a key part of the task of strengthening global health governance and diplomacy.

An alternative approach is to focus on the nature or characteristics of a health issue, and then to categorize it as a certain type of "global health" problem requiring collective action. Building on the previously described distinction between globalization, as strictly defined, and other common uses of the term, we can arrive at a clearer understanding of the health needs arising within an increasingly globalized world that require collective action. Within the public health community, there has been a broad shift in nomenclature between the terms "international health" and "global health." The reasons for this shift, and the conceptual difference between the two terms, have elicited much discussion. Brown et al. (2006) locate the historical roots of international health in 19th century European imperialism, when the priority for collective health action was controlling epidemic diseases spreading from colonized territories. In contrast, global health encompasses a shift to putting "the health needs of the people of the whole planet above the concerns of particular nations." Koplan et al. (2009) distinguish among public (or population), international (interstate) health, and global health, with the last variably "thought of as a notion (the current state of global health), an objective (a world of health people, a condition of global health), or a mix of scholarship, research, and practice (with many questions, issues, skills, and competencies)."

Following Scholte's work, a strict definition of global health would limit the term to issues characterized by the transcendence of territorial boundaries. The issue must be caused by factors that transcend territorial geography, or possess the capability to occur or spread in ways that do so—that is, it must be "transboundary"—to be classified as a global health problem. Needless to say, not every health problem qualifies. Guinea worm infection, for example, remains a residual health threat in many parts of Africa. By comparison, significant political and financial capital has been expended on human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS). The distinction drawn might be explained, at least in part, by the fact that the former is transmitted via an animal vector that is prevalent only in certain parts of the world. The other is a disease spread by close contact with infected bodily fluids, an event that can occur in any part of the world.

Another good example is communicable diseases having the potential to become pandemic. The migration of wild birds across territorial boundaries on a regional and even planetary scale, for instance, makes avian influenza a global health issue. The increased distribution of the *Aedes aegypti* mosquito over the past 25 years, due to global climate change, local environmental

conditions, and increased transport links (e.g., ship, airplanes) worldwide (European Centre for Disease Prevention and Control, n.d.), means that associated diseases such as yellow fever, dengue, and chikungunya should be considered global health issues.

The large-scale trade in illicit goods such as counterfeit medicines, tobacco products, and narcotics, enabled by a worldwide network of criminal organizations, represents another example of a global health issue. Likewise, the use of social media—whose content is accessible worldwide and pose challenges for national authorities to regulate—to promote unhealthy lifestyles and health-harming products can be considered a global health issue.

Focusing on health determinants, lung cancer and liver cirrhosis could be described as global health issues because their causal factors are transboundary (i.e., transnational tobacco and alcohol companies). In contrast, the nutritional taboos practiced in some cultures, which may lead to nutritional deficiencies in pregnant women and children, pose a serious problem but are not a global health issue by virtue of their localized practice.

Collectively, these examples, when a stricter definition of globalization is applied, suggest that there are relatively few truly global health issues. In this chapter, by balancing the stricter and looser definitions of globalization and global health, we can describe health issues requiring collective action in a globalizing world as falling into four main categories (Lee, Hawkins, & Wiist, 2016):

- *Cross-border or transborder problems* originate in one locale but have wider ramifications for other locales (e.g., large-scale communicable disease outbreaks; advertising, marketing, and promotion of health-harming products via social media).
- *Commons problems* concern disputed access to or use of shared resources across societies (e.g., intellectual property rights over genetic sequencing, access to vaccines and other essential medicines).
- *Shared problems* are widely experienced across geographies due to changes to social and natural environments from intensifying globalization (e.g., increased popularity of computer gaming and childhood obesity, lack of safe water and sanitation).
- *Planetary problems* arise from the cumulative actions of individuals and populations in many countries (e.g., spread of antibiotic resistance, impact of climate change on distribution of disease vectors).

The forms of collective action needed to address these categories of global health issues are discussed in the next section.

What Is Global Health Governance?

Governance concerns the agreed rules for interaction and procedures for decision making adopted by an organized society to address its collective needs and deliver shared solutions. The agreed rules and procedures relate to such considerations as membership in the society, obligations and responsibilities of members, forms of engagement and decision making, mobilization and distribution of resources, dispute settlement, and implementation and evaluation of actions taken. Defined in this way, governance should be recognized as occurring across many types, and at many different levels, of social organization (Dodgson, Lee, & Drager, 2002). In global health, governance is essential to groups ranging from local community groups (e.g., patient advocacy groups, community health centers) to globally operating organizations (e.g., global public–private partnerships, transnational corporations).

Importantly, as Rosenau (1995, p. 4) writes, governance is not the same as government:

> Both refer to purposive behavior, to goal oriented activities, to systems of rule; but government suggests activities that are backed by formal authority . . . whereas governance refers to activities backed by shared goals that may or may not derive from legal and formally prescribed responsibilities and that do not necessarily rely on police powers to overcome defiance and attain compliance.

Government, in other words, is a particular form of governance, where a recognized body applies agreed rules and procedures in ways that are binding on the society's members. The formation of the international states system during the mid-17th century, for example, is based on the principle that national governments are sovereign, having ultimate authority over their own territories and populations. Above the state, where formally binding authority exists to a more limited degree, collective action is heavily reliant on governance. International law exists but is circumscribed in scope and authority. Where formal authority to govern does not exist, compliance is based on custom, common law, cultural norms and values, and public opinion.

Health governance, in turn, can be defined as the agreed rules for interaction and procedures for decision making adopted by an organized society to address collective health needs and deliver shared health solutions. Such rules and procedures can be

binding, such as various types of health-related legislation adopted and enforced by governments, or they can be reliant on nonbinding mechanisms (e.g., Hippocratic Oath, resolutions, codes of practice). Historically, the locus of health governance has been at the national level (and delegated to the subnational level), as the governments of sovereign states have held primary responsibility for protecting and promoting the health and well-being of their own populations. Where health determinants and outcomes spill over national borders and create cross-border or transborder impacts, international (intergovernmental or interstate) governance mechanisms have facilitated cooperation between two or more governments.

Indeed, there is a long and established history of *international health governance*. For example, the recurrence of bubonic plague, which caused as many as 50 million deaths during the 6th to 8th centuries, resulted from burgeoning trade links between Asia and Europe. The disease was spread by rat-infested ships along the Mediterranean coast and then inland via transported goods. The disease returned during the 14th century, transported by trade from Asia; it reached first Italy and then the rest of Europe, eventually killing one-third of the continent's population. The outbreaks led to closer cooperation among ruling authorities, including the introduction of quarantines (Cohn, 2002; Watts, 2003).

Similarly, the transition of cholera from an endemic disease limited to South Asia, to a pandemic disease reaching Europe in the 1830s, and then recurring on various continents over the next two centuries, was initially caused by the social, political, and economic upheavals of European imperialism (Lee & Dodgson, 2000). The cholera epidemics of the 19th century prompted European countries and the United States to hold a series of International Sanitary Conferences and adopt the International Sanitary Conventions (forerunner of the International Health Regulations). The formation of the League of Nations Health Organization in 1919 after World War I, amid the devastating 1918–1920 influenza pandemic, and then the founding of WHO after World War II, are other key examples of institutional arrangements for international health governance led by sovereign states (for more on this history, see the Introduction to this text).

The term *global health governance* was coined in the late 1990s to describe the diversity of governance mechanisms that go beyond intergovernmental health cooperation (Dodgson et al., 2002). In large part, these new institutional arrangements have been prompted by the "real world" of accelerating and intensifying globalization. These impacts are challenging the capacity of states, acting alone or collectively, to protect and promote the health of their domestic populations. As Aginam (2005, p. 58) writes:

> Transboundary disease spread now constitutes a global crisis that requires the pooling of efforts and resources by nation states in a multilateral context. In no other sphere of global relations is the global village metaphor more practical . . . [in view of] the permeation of national boundaries by disease pathogens and the consequent vulnerability of populations within those boundaries to microbial threats.

The forms of health governance that have emerged in response to these challenges are distinct in several ways. First, given the scale and scope of cross-border and transborder health risks faced, GHG is characterized by *collective action less focused on national borders*. International health governance is built on practices such as screening at ports of entry, quarantine measures, and national disease surveillance and reporting. The global geographies of health and disease, which create new spatial distributions and dynamics of health determinants and outcomes, require different forms of governance. Disease surveillance, monitoring, and reporting systems, which do not rely wholly on data collected by and about states, now provide valuable supplements to the International Health Regulations (IHRs), which were revised in 2005 (see the *Public Health Infrastructure* chapter for more information on the IHR). The Global Public Health Intelligence Network (GPHIN), created in 1997 by Health Canada, analyzes 20,000 online news reports worldwide in 9 languages each day, to alert WHO of potential outbreak risks (Dion, AbdelMalik, & Mawudeku, 2015). The concept of *planetary health*, based on an understanding that human health depends on the wise stewardship of natural systems, raises concerns about "present systems of governance" as "inadequate to address the threats to planetary health" (Whitmee et al., 2015, p. 1974) (see the *Environmental and Occupational Health* chapter for more on planetary health).

Second, GHG is characterized by a *growth in the number, and degree of influence, of non-state actors*. Non-state actors are organizations operating outside of the state or governmental sphere. They can be either for-profit or not-for-profit entities, depending on how they earn and use their financial resources. In general, *for-profit organizations* (e.g., private businesses, industry associations, consultancy firms) seek to maximize their financial returns, and use the earned proceeds to benefit private owners and shareholders. In contrast, *not-for-profit organizations* (e.g., patient groups, charities, religious groups, healthcare cooperatives) seek

financial returns to serve shared or public interests. The boundaries dividing these two categories are not entirely clear cut, with ongoing debates concerning the vested interests served by some non-state actors such as trade unions, think tanks, and private foundations.

What is notable, in global health and other spheres of global governance, is that the number of non-state actors has grown more rapidly than the number of governmental actors. Using data from the *Yearbook of International Organizations*, Weiss et al. (2013) describes a dramatically changing landscape over the 20th and early 21st centuries (**FIGURE 21-1**). Since 1950, more than 33,000 international governmental organizations (IGOs) and international nongovernmental organizations (INGOs) have been founded—more than one per day. INGOs grew especially rapidly during the final decades of the 20th century, to the point that they outnumbered IGOs by 9.5 to 1 by 2000.

As well as becoming more numerous, some non-state actors now bring substantial resources to global health and, by extension, can command a louder voice in GHG. The most prominent example is the Bill & Melinda Gates Foundation (BMGF), which was launched in 2000. By 2016, private foundations tracked by the Institute for Health Metrics and Evaluation provided $2.3 billion to global health development, of which 78.5% as disbursed by the BMGF (Institute for Health Metrics and Evaluation, 2017). This undeniable generosity brings vital new funding for a variety of health needs, and has been especially welcomed amid flagging aid commitments by donor governments since the late 2000s. As the relative size of funding by private foundations has grown, however, important questions about their governance have been raised. Whereas international (governmental) organizations are accountable to member states, in principle, and in turn the citizens of those member states, concerns have arisen about the public accountability of private foundations. The BMGF, for example, is headed by an Executive Leadership Team that "oversees all of the foundation's efforts" (BMGF, n.d.). As Harman (2016, p. 350) points out, this arrangement has led to concerns about the "sources of its money, how and where it spends its money, its partnerships, and the 'Bill Chill' effect of the foundation on global health institutions." The last concern includes the tendency to support, and therefore skew global health initiatives toward, disease-focused and technology-based approaches. Birn (2014), for example, goes further by arguing that its "pervasive influence . . . [is of] grave concern both to democratic global health governance and to scientific independence." In response, efforts are being made to improve the transparency and accountability of all non-state actors, especially those as influential as the BMGF (Youde, 2013).

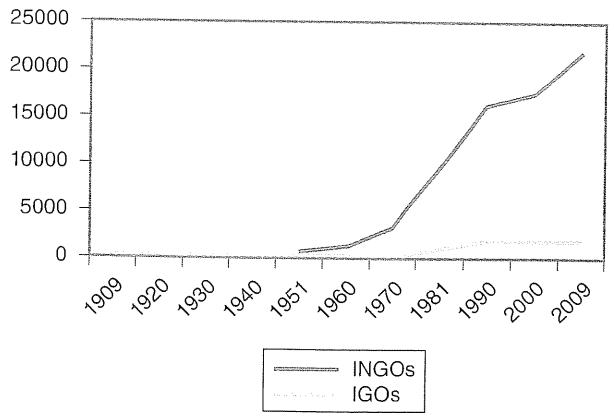


FIGURE 21-1 Number of intergovernmental and international nongovernmental organizations, 1909–2009.

Reproduced from Weiss, T., Seyle, D., & Coolidge, K. (2013). *The rise of non-state actors in global governance opportunities and limitations* [Discussion paper]. Broomfield, CO: One Earth Future Foundation. Retrieved from http://acuns.org/wp-content/uploads/2013/11/gg-weiss.pdf

The way that non-state actors are governed and their role in governing global health relate to the wider range of functions they now perform in GHG. As Haas (2004) describes, global governance comprises a range of functions, with state and non-state actors performing these functions either formally and directly, or informally and indirectly (**TABLE 21-1**). In GHG, traditionally non-state actors have played a supplementary role where government institutions have been weak or nonexistent, where there are gaps in funding and resources, or where neglected issues or constituencies require advocacy. However, a review of the functions performed by civil society organizations (CSOs) in relation to four GHG instruments—the International Code on the Marketing of Breastmilk Substitutes, the Framework Convention on Tobacco Control (FCTC), the International Health Regulations, and Codex Alimentarius—noted that they now play a critical watchdog role, ensuring that formally mandated governmental institutions fulfill their responsibilities appropriately, and keep a watchful eye on corporate actors exerting undue influence or engaging in health-harming activities (Lee, 2010). These functions have been essential to the International Code on the Marketing of Breastmilk Substitutes, where ongoing campaigning and advocacy by CSOs have been critical to achieving policy attention. CSOs play an even more significant role in the negotiation and implementation of the FCTC, fulfilling an unusually wide range of functions traditionally dominated by governments. By comparison, CSOs have been less involved in formal proceedings of the Codex Alimentarius Commission or the revision process for the IHR (2005). In regard to the latter, there is now formal recognition of the

TABLE 21-1 Matrix of Global Governance Functions

Function	Formal/Direct	Informal Indirect
Issue linkage	■ Intergovernmental negotiations ■ New information provided by epistemic communities ■ Through financial mechanisms (GEF) ■ IOs (GEO/WEO)	■ Scientists ■ Business/industry
Agenda setting	■ IOs and member states ■ Scientists	■ NGOs ■ Media ■ Scientists
Developing usable knowledge	■ Scientists	■ Scientists ■ NGOs ■ Business/industry
Monitoring	■ IOs ■ Commitees nominated by MEA secretariat ■ MEA signatory governments	■ NGOs (particularly in developing countries) ■ Scientists
Rule making	■ Negotiations by governments ■ NGOs (principled standards)	■ Business/industry (de facto standards) ■ NGOs (principled standards)
Norm development	■ Epistemic communities	■ NGOs (equity & environmental preservation) ■ Business/industry (efficiency)
Policy verification	■ Governments	■ NGOs ■ IOs
Enforcement	■ (Hard) Law ■ WTO and MEA rules	■ NGO campaigns
Capacity building (tech transfer)	■ Official technical assistance (national and local government) ■ Business/industry ■ Science community (education/training)	■ Business/industry (joint venture)
Capacity building (organizational skills)	■ IOs ■ NGs ■ Scientific community (education/training)	■ Business/industry
Promote vertical linkage	■ IOs ■ National and local governments	■ NGO ■ Scientific community
Financing	■ Government (ODA) ■ Regional development banks ■ Multilateral bodies	■ Business/industry

importance of CSOs in effective disease surveillance, as these organizations may play a supplementary role when state institutions cannot or will not report to WHO promptly.

Moreover, new combinations of state and non-state actors, in a myriad of partnerships, alliances, coalitions, networks, and joint ventures, now populate the field of health cooperation. These institutional arrangements for GHG reflect the search for collective action that can overcome the limitations of state authority. In a few cases, they also mark a shift in the role of non-state actors from being the subject of governance (i.e., law takers) to being participants in governance (i.e., law makers) (Ryngaert, 2016). The board of the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM), for example, is "designed to incorporate leading stakeholders in an inclusive and effective way"; consequently, nongovernmental organizations (NGOs), communities affected by the three diseases, the private sector, and private foundations are represented as voting members of the board (GFATM, 2017). In addition, "a broad range of stakeholders, moving beyond the usual participants to reach those who are not normally involved in Global Fund processes" contribute "critical input, suggestions and views about the development of the strategy that guides the Global Fund's mission" through a Partnership Forum (GFATM, 2017). Similarly, the decision-making body of UNITAID (Executive Board), an international organization that raises and grants funds to prevent, diagnose, and treat the same three diseases, includes two representatives of relevant civil society networks (NGOs and communities living with HIV/AIDS, malaria, or tuberculosis [TB]) and one representative of private foundations (UNITAID, 2017).

Third, GHG is characterized by *binding and nonbinding instruments*. Binding instruments, in the form of treaties (sometimes known as conventions), are written agreements concluded by two or more states, and governed by international law. Signatories to binding treaties are legally required to comply with the measures contained within them and, in return, are themselves protected by their provisions. Nonbinding instruments come in diverse forms (e.g., declarations, principles, resolutions, voluntary codes, communiqués) and, given the primacy afforded to the sovereign authority of states, tend to be far more numerous (Taylor, 2013). Although these types of instruments cannot compel compliance by state and non-state actors, their power to shape collective action in global health can stem from their political or moral weight (Kates & Katz, 2010).

In global health cooperation, there are relatively few binding instruments, each of which has required substantial diplomatic efforts to achieve. **TABLE 21-2** provides examples of binding and nonbinding instruments related to GHG. In addition to the treaties leading to the creation of WHO and other international health organizations, WHO member states have agreed to the IHR and FCTC as binding treaties. Professor Lawrence Gostin and others have advocated for the adoption of a binding Framework Convention on Global Health to underpin GHG. As Gostin et al. (2012, p. 790) write:

> A framework convention would establish a health financing framework with clear obligations, and would create an accountability regime with robust standards, monitoring, and enforcement. It would advance health justice through engaging marginalized and underserved populations in making and evaluating policies and through comprehensive strategies and targeted interventions designed to overcome the barriers that prevent these populations from enjoying the conditions required for good health. Governments would be held to high standards of good governance, namely inclusive participation, transparency, honesty, accountability and stewardship. The framework convention would empower people to claim their right to health.

A number of treaties concluded by other international organizations have health-related provisions, such as the International UNICEF Convention on the Rights of the Child (1989) and the World Trade Organization's (WTO) Doha Declaration on the TRIPS Agreement and Public Health (1994). More common are the large number of nonbinding instruments that encourage state and non-state actors to adopt agreed standards, norms, and practices. **EXHIBIT 21-1** describes the WHO Global Code of Practice on the International Recruitment of Health Personnel (2010), which seeks to address the serious problem of health worker migration causing "brain drain" from LMICs to high-income countries. Overall, whether the global health community seeks to achieve a binding or nonbinding instrument depends on the perceived importance and priority of an issue, which in turn shapes the instrument's political feasibility. The decision by a government to become party to a binding instrument is taken after careful consideration of the country's foreign policy as a whole, and not just its health policy. There is generally a tradeoff when agreeing to be bound by international law, between

TABLE 21-2 Examples of Binding and Nonbinding Intergovernmental Agreements Related to Global Health Governance

Binding Instruments	Nonbinding Instruments
UN Convention Relating to the Status of Refugees (1967)	WHO/UNICEF Declaration of Alma Ata on Primary Health Care (1978)
Convention on the Elimination of All Forms of Discrimination Against Women (1981)	WHO Code on the International Marketing of Breastmilk Substitutes (1981)
UNICEF Convention on the Rights of the Child (1989)	UN Principles for the Protection of Persons with Mental Illness and for the Improvement of Mental Health Care (1991)
WTO Doha Declaration on the TRIPS Agreement and Public Health (1994)	ILO Code of Practice Management of Alcohol- and Drug-Related Issues in the Workplace (1999)
Cartagena Protocol on Biosafety to the UN Convention on Biological Diversity (2003)	UN Millennium Development Goals (2000)
Stockholm Convention on Persistent Organic Pollutants (2004)	UN Declaration of Commitment on HIV/AIDS (2001)
WHO Framework Convention on Tobacco Control (2005)	FAO Guidelines on the Right to Food (2004)
WHO FCTC Protocol to Eliminate Trade in Illicit Tobacco Products (2012)*	OECD Paris Declaration on Aid Effectiveness (2005)
WHO Revised International Health Regulations (2005)	WHO Global Code of Practice on the International Recruitment of Health Personnel (2010)
UN Convention on the Rights of Persons with Disabilities (2008)	WHO Global Recommendations on Physical Activity for Health (2010)
	UN Political Declaration of the High-Level Meeting of the General Assembly on the Prevention and Control of Non-communicable Diseases (2012)
	UN Sustainable Development Goals (2015)
	Shanghai Declaration on Promoting Health in the 2030 Agenda for Sustainable Development (2016)
	UN Political Declaration on Antimicrobial Resistance (2016)

Abbreviations: FAO = Food and Agriculture Organization; ILO = International Labour Organization; OECD = Organisation for Economic Co-operation and Development; UN = United Nations; WHO = World Health Organization; WTO = World Trade Organization.

* The agreement was signed on November 12, 2012, and will come into force when 41 states party to the FCTC have ratified and acceded to the protocol.

a lessened ability to act unilaterally, and the benefits accrued when other countries are bound in the same way. Negotiating binding instruments, therefore, requires governments to accept a shared interest in concluding such an agreement. Nonbinding instruments can raise attention to an issue, create agreement on new norms and practices, and thus be effective means of GHG. In some cases, nonbinding instruments can progress to the negotiation of binding agreements as perspectives change within the global health community.

In summary, GHG concerns the agreed rules for interaction and procedures for decision making to address collective health needs and deliver shared health solutions in a global context. These rules and procedures are negotiated and upheld by state and non-state actors, serving formal and informal roles, and are embodied in binding and nonbinding instruments, resulting in direct and indirect impacts on global health. Importantly, in the early 21st century, a transition from *international* to *global* health governance has begun. The design and adoption of a wholly new "architecture" of GHG is unlikely given the complex political, technical, and practical challenges posed. Instead, the world is likely to be governed by diverse and complex institutional arrangements varying across geography, constituency, and issue-area. It is from this starting point that this chapter now turns to describing the existing institutional arrangements commonly referred to as GHG.

EXHIBIT 21-1 WHO Global Code of Practice on the International Recruitment of Health Personnel

According to the *World Social Protection Report 2014/15,* countries need at least 41.1 health workers per 10,000 people to be able to provide essential health care to their own populations. For many low-income countries, however, the available personnel fall far short of this ratio. For example, in countries such as Haiti, Niger, Senegal, and Sierra Leone, there are 5 or fewer health workers available per 10,000 people, compared to 269 in Finland. In 2014, it was estimated that there was a total shortfall of 10.3 million health workers worldwide (International Labour Organization [ILO], 2015). This situation has arisen for many reasons, but one key factor is certainly health worker migration.

Global patterns of health worker migration are complex and dynamic, producing a mixture of costs and benefits at the individual and population levels. The effects are also felt differently across the diverse source and destination countries. In general, the pattern of flow is from low-income countries to higher-income countries. The problem is most acute in sub-Saharan Africa, which has 24% of the global disease burden but only 3% of the health workforce (Taylor, Hwenda, Larsen, & Daulaire, 2011). This "brain drain" ultimately weakens the health systems capacity in the source countries that bear a disproportionate share of the costs. While destination countries benefit from such migration by filling gaps in human resources and strengthening their capacity to deliver health services, source countries lose valuable human capital and, in turn, face gaps in their health services.

Health worker migration has been the subject of longstanding discussions within the global health community. The issue requires collective action across countries because of the cross-border dynamics (i.e., the "pull" factors attracting health workers to migrate stem from outside of affected countries) and the shared experience of brain drain (i.e., 57 low-income countries face critical shortages in their healthcare workforces [WHO, 2006]). Moreover, health worker migration is arguably a planetary problem. As Taylor et al. (2011) write:

> These shortages . . . contribute substantially to the weakness of health systems and obstruct the achievement of public health goals such as reductions in maternal and child mortality; they also hinder implementation of such international legal agreements as the WHO 2005 International Health Regulations, which aim to protect populations from the international spread of disease and to enhance public health security. Strong health systems are essential to improving health outcomes in underserved populations. Without effective health systems employing enough skilled, motivated, well-supported, and adequately supervised health workers, it's unlikely that vaccines and other important medical interventions can improve global health outcomes in any sustainable way. *

Recognizing that countries cannot address this problem alone, the global health community has developed a variety of strategies to improve the governance of health worker migration. Alongside strategies to increase the supply of health workers, deploy available resources more effectively (e.g., task-shifting), and change the incentive structures supporting migration, codes of practice have been adopted to regulate the active recruitment of workers from low-income settings. These governance instruments include the Kampala Declaration adopted at the First Global Forum on Human Resources for Health, the World Medical Association Statement on Ethical Guidelines for the International Recruitment of Physicians (2003), and a large number of bilateral agreements (Pagett & Padarath, 2007). For the most part, these voluntary codes have had limited scope and ultimately minimal effects in stemming the outward flow of healthcare workers (Mackey & Liang, 2013).

In May 2010, the WHO Global Code of Practice on the International Recruitment of Health Personnel was adopted as a framework for cooperation and platform for continuing dialogue on the critical problem of health worker migration. Siyam et al. (2013, p. 820) describe the process of negotiation as "vigorous" and displaying "maturity and a favourable evolution in global health diplomacy." The Global Code is based on the agreed principle, embedded in the WHO Constitution, that all people have a right to the highest attainable standard of health. At the same time, it recognized that health workers have the right to migrate from one country to another in search of employment. As a nonbinding instrument, the Global Code calls upon member states to voluntarily implement and report on measures that uphold these principles.

While a voluntary code might seem to be a limited advance from previous efforts to address international recruiting of healthcare personnel (Tankwanchi, Vermund, & Perkins 2014), some have argued that the Global Code's approach signals a shift in the debate based on recognition of health worker migration as a social problem requiring global solidarity. The adoption of the Global Code by all 193 member states also reflects universal support among all countries for collectively addressing the issue more effectively. WHO describes the code as a "groundbreaking instrument [that] marks the first time that WHO member states have used the constitutional authority of the Organization to develop a code in thirty years" (WHO, n.d.).

With the Global Code now in place, attention has shifted to promoting its implementation, which has so far been limited. The need for more robust reporting by member states on their progress in the implementation of the code has been identified as an unresolved issue (Siyam et al., 2013).

*Reproduced from Taylor, A. L., Hwenda, L., Larsen, B., & Daulaire, N. (2011). Stemming the brain drain—A WHO Global Code of Practice on International Recruitment of Health Personnel. *The New England Journal of Medicine, 265,* 2348–2351. Copyright © 2011 Massachusetts Medical Society. Reprinted with permission from Massachusetts Medical Society.

Mapping Existing Institutional Arrangements Governing Global Health

The complex and diverse institutional arrangements that currently constitute GHG have evolved over time into a mixture of international organizations, mechanisms, and instruments. This evolution has not been guided by an overarching plan, but rather has been characterized by a *laissez-faire* approach to institutional building, largely driven by powerful state and non-state actors. Moreover, differing opinions among these powerful actors regarding which global health goals should be given priority, and how best to achieve them, have led to the formation of numerous initiatives focused on specific diseases, populations, and geographic locales. While there are interconnections and complementarities among some of these initiatives, there are also gaps, overlaps, and even working at cross purposes. In this context, mapping these numerous institutional arrangements, and the ways in which they have evolved over time, is not a straightforward task.

One way of mapping GHG is to understand it as a process of cumulatively adding new actors over time. A familiar starting point is to locate WHO as the beginning, and at the center, as the "directing and coordinating authority on international health work" (WHO, 1946). The period from the end of World War II to the late 1990s saw WHO's program of work expand in breadth and depth, alongside the establishment of other United Nations bodies concerned with health, including the UN Children's Fund (UNICEF), UN Development Program (UNDP), and UN Population Program. In the 1980s, the World Bank began to take an active role in health as part of its development financing role. In the 1990s, a broader range of other sectors began to be involved, including trade and investment, finance, customs and excise, education, and public works (water and sanitation). Globalization was broadening the factors affecting health determinants and outcomes, and health was impacting on other policy spheres. Health became more prominent on the agendas of the Organisation for Economic Co-operation and Development (OECD), the Group of Eight (G8), and the Group of 20 (G20). New global health partnerships were formed soon after, involving state and non-state actors, alongside emerging economies such as Brazil, Russia, India, China, and South Africa (i.e., the BRICS countries). Thus, GHG is seen as evolving from WHO's foundational role, with succeeding layers adding different actors and institutional arrangements over time (**FIGURE 21-2**).

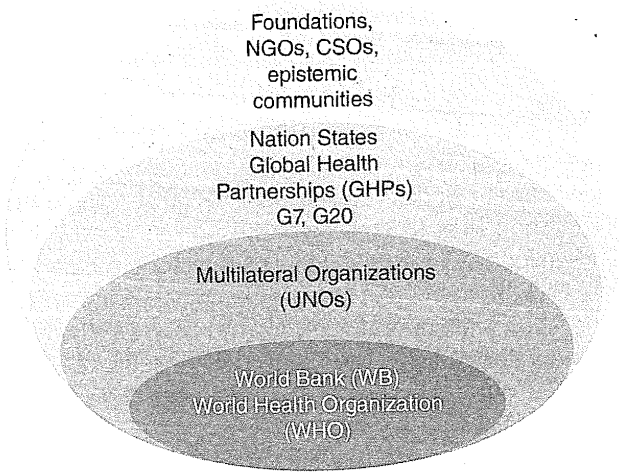


FIGURE 21-2 Prominent global health governance actors in the 21st century.

Used with permission from Okello, A., Vandersmissen, A., & Welburn, S. (2014). One health into action: Integrating global health governance with national priorities in a globalized world. In K. Zomsstag, E. Schelling, M. Whittaker, M. Tanner, & D. Waltner-Toews, (Eds.), *The theory and practice of integrated health approaches* (pp. 283–303). Wallingford, UK: CABI.

A second way of mapping GHG is to understand the changing roles and relationships played by the state, market, and civil society. State actors consist of governmental bodies, led by ministries or departments, service providers, and other agencies that serve the public interest. In GHG, this concept embraces national-level bodies concerned with health security (e.g., centers for disease control, public health agencies), health development (e.g., U.S. Agency for International Development, German Technical Cooperation Agency), and foreign policy (e.g., Global Affairs Canada), and along with international-level bodies with membership primarily composed of governmental actors (e.g., WHO, World Bank, UNICEF).

The distinctiveness of the state sphere, and therefore the central role and authority of states configured into intergovernmental organizations, is seen as changing with the advent of GHG. Since the 1990s, GHG can be mapped as an increasing overlap of the three spheres under shared institutional arrangements for the purpose of governing global health. As discussed in the previous section, non-state actors traditionally operate separately from the governmental (state) sphere, and can be divided into for-profit (market) and not-for-profit (civil society) entities. Both types of non-state actors have grown substantially in number and influence since the late 20th century. GHG can be described as bringing together the three spheres, in different configurations, to realize new resources, comparative advantages, and, ultimately, greater effectiveness (**FIGURE 21-3**). The formation of

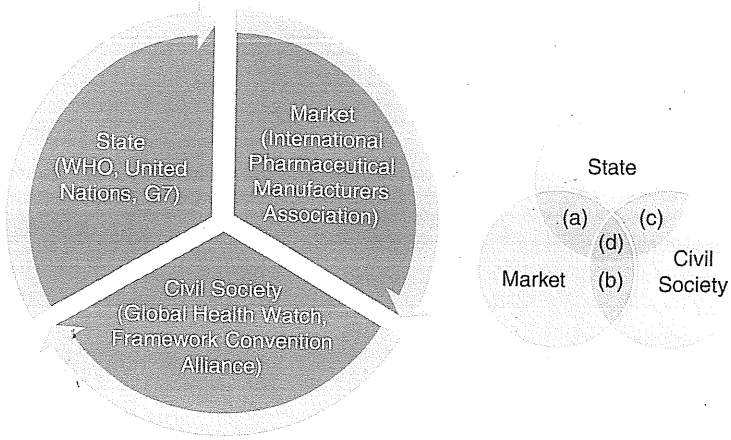


FIGURE 21-3 Transition from distinct to overlapping spheres of state, market, and civil society in global health governance.

dozens of global public–private partnerships between governments and the pharmaceutical sector, such as the Innovative Medicines Initiative between the European Commission and the European Federation of Pharmaceutical Industries and Associations, can be located in section (a) of Figure 21-3. Charitable foundations, which some argue should be located in either the market or civil society sector, might be more accurately fall between the two spheres into (b). The collaboration by Médecins sans Frontières with WHO to provide logistics for sleeping sickness (human African trypanosomiasis) drug distribution in endemic countries, is an example of section (c) of Figure 21-3. Finally, section (d) is where all three spheres come together, as exemplified by the GFATM, the Global Alliance for Vaccines and Immunization (GAVI), and UNITAID.

A third way of mapping institutional arrangements for GHG is by specific function. As described in Table 21-1, global governance fulfills a variety of functions (e.g., issue linkage, monitoring, financing) to which state and non-state actors may contribute formally or informally, with direct or indirect effects (Haas, 2004). Historically, WHO was tasked with fulfilling a broad range of these functions, including taking a lead role in agenda setting. By the 1990s, growing demands on that organization's capacities, and severe limitations of an essentially frozen budget, alongside internal challenges posed by a bureaucratic structure and weak leadership, elicited debate about the appropriate scope of WHO's mandate (Godlee, 1994). At the heart of the question of "who should be doing what in health" among UN bodies (Lee, Collinson, Walt, & Gilson, 1996) was defining the core or essential functions to be retained by WHO. Despite reforms to address some of the structural and procedural problems hindering WHO's capacity, the organization faced a growing number of "work-arounds" by dissatisfied donors who supported the creation of new initiatives. The result was a supply-driven expansion of global health initiatives, some located within WHO, but most governing their own operations.

By the early 2000s, GHG had become a varied collection of institutional arrangements that were fulfilling different functions, but not acting collectively as a whole. **FIGURE 21-4** illustrates the many state and non-state actors involved in the financing of global health (mobilization, allocation, and implementation) during this era. In this environment, despite its designation as the "directing and coordinating authority," WHO was now seen as one potential partner in a crowded GHG landscape.

While debate continues about WHO's mandate, other players have shifted their attention to the broader question of what should be the core functions of GHG more generally. For example, the concept of global public goods takes a residual view of GHG functions, considering those areas of concern to arise from "market failures" or to be undersupplied without collective action (Smith & MacKellar, 2007). Similarly, the Oslo–*The Lancet* Commission on Global Health Governance has suggested how different functions might be distributed across a restructured GHG system (Ottersen et al., 2014).

In sum, what is presently referred to as GHG is, in actuality, a less than perfect patchwork of institutional arrangements that have evolved, in *laissez-faire* fashion, from a combination of supply-driven donor dissatisfaction and demand-driven health needs arising from globalization. Truly *global* governance in the health sphere is so far limited in scope, authority, and function. It would thus be misleading to refer to GHG

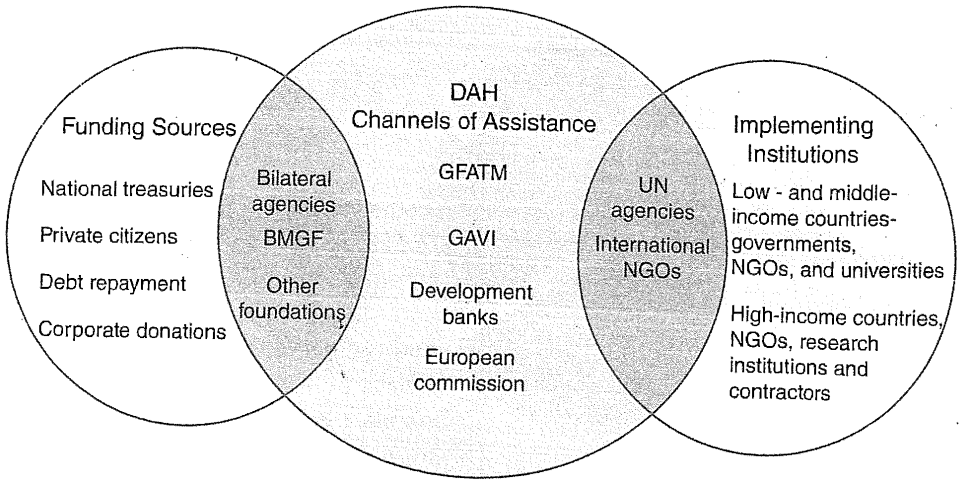


FIGURE 21-4 Overlapping roles of state and non-state actors in financing of global health governance.
Reproduced from Institute for Health Metrics and Evaluation. (2009). *Financing global health 2009: Tracking development assistance for health*. Seattle, WA: IHME.

as a "system" or "architecture" in its present form, as this would suggest an agreed strategy or vision to guide its construction or evolution. Rather, what we have is a partial transitioning from international to global health governance, for selected areas of collective action such as AIDS, TB, and malaria, and to prevent and control major communicable disease outbreaks (**EXHIBIT 21-2**). For most other issue areas, national and international health governance remains the basis for collective action.

The Role of Global Health Diplomacy

The building of effective GHG relies on the conduct of global health diplomacy. *Diplomacy* is the art or practice of conducting international relations through negotiating alliances, treaties, and other agreements. It is concerned with dialogue "designed to identify common interests and areas of conflict between the parties" (Evans & Newham, 1992). This discussion, in turn, is guided by a country's *foreign policy*, the activity whereby state actors act, react, and interact at the boundary between the internal (domestic) and external (foreign) environments. Thus, while foreign policy is "the substance, aims and attitudes of a state's relations with others," diplomacy is "one of the instruments employed to put these into effect" (Reynolds, 1980, p. 36). The term "new diplomacy" describes shifts in foreign policy that challenge how diplomatic practice is carried out. More recently, it has been used to describe the global context, diverse actors, and innovative processes shaping contemporary international relations. Another key feature of new diplomacy has been a shift in the participants, from highly trained officials within foreign affairs ministries to a broader range of political actors (Heine, 2006).

Importantly, new diplomacy has been shaped by non-state actors. While diplomats formally interact with their counterparts, their constituencies are increasingly broad based. Bayne and Woolcock (2007) argue that globalization, and the growing influence of non-state actors, is transforming foreign policy in the 21st century. As Davenport (2002, p. 19) writes, "thousands of nongovernmental organizations have come on stage in recent years, driving their own issues to the top of the diplomatic agenda." Solana (2009) argues, therefore, that "diplomacy is about more than mobilizing states. We need to find ways to harness the expertise and resources of nongovernmental organizations and companies and energize individuals towards shared goals." This diversification of a diplomat's constituencies is illustrated by the "explosion of multilateral negotiations aimed at addressing the new global environmental issues" (Benedick, 1998, p. 4). While the diplomat's formal role is to serve as an official representative of a state, new diplomacy requires engagement with wider constituencies. Thus, it requires what Riordan (2002) calls a "radical restructuring of diplomatic services, replacing hierarchical with networked structures, and the creation of new forms of interaction." New diplomacy, for example, seeks to harness new technologies, altering negotiations through enhanced consultation, coordination, information gathering, and analytical capabilities.

More broadly, social/cultural activities are seen by public diplomacy advocates as important means of promoting understanding and influence. Governments are not alone in the use of such technologies. Non-state actors see new technologies, including social networking, as means for exerting "soft power," especially when they lack military and economic resources. Consequently, there has been growing

EXHIBIT 21-2 The Global Governance of Pandemic Influenza

Influenza is a respiratory infection characterized by the rapid onset of symptoms such as fever, chills, body ache, and unproductive cough. Influenza can cause severe health problems for the elderly and the young, as well as for people with weakened immune systems. Of the three types of influenza viruses (A, B, and C), type A is of greatest public health concern. Type A viruses infect both human and various animal species, which expands the pathogens' reservoir. These viruses are unstable because they regularly mutate in minor ways (antigenic drift), but periodically mutate in major ways (antigenic shift). Genetic reassortments occur when a human influenza virus and zoonotic influenza virus coinfect a human or animal (e.g., pig, bird) host, exchange RNA, and produce a novel virus. Depending on its characteristics, the novel virus could trigger human or animal epidemics or wider pandemics.

Governments have long recognized that influenza requires collective action given the enduring risks posed by the disease and the substantial human and social impacts caused by outbreaks. For these reasons, WHO member states have agreed that global influenza governance must fulfill four core functions: surveillance and reporting, preventive measures, effective response, and public communication.

First, *surveillance and reporting* provides vital knowledge of which influenza strains are circulating, thereby enabling the planning and implementation of interventions such as vaccines. This function is carried out by the WHO Global Influenza Surveillance and Response System (GISRS), established in 1951 and operating in 83 countries. The GISRS consists of 112 national influenza centers, 4 Collaborating Centers for Reference and Research (Australia, Japan, United Kingdom, and United States), and the Collaborating Center for Studies on the Ecology of Influenza in Animals (United States). In addition, the GISRS operates FluNet, a global web-based tool for influenza virologic surveillance that was launched in 1997. The virologic data entered into FluNet (e.g., number of influenza viruses detected by subtype) are critical for tracking the movement of viruses globally and interpreting the epidemiologic data. FluNet recommends, twice annually, the content of the influenza vaccine for the coming season, and serves as an early alert mechanism for the emergence of a virus with pandemic potential. FluNet also forms part of the WHO Global Outbreak Alert and Response Network (GOARN), established in 2000, to combat the worldwide spread of disease.

Second, an important function of effective global influenza governance is to *undertake preventive measures that reduce the disease burden on populations*. Given that influenza viruses, including H5N1, are endemic in a growing number of countries, and contact between human and animal populations remains difficult to control, most experts agree that no form of governance can prevent the emergence of new influenza strains. However, public health agencies, in cooperation with animal health experts and the agricultural sector, can control the spread of the virus and mitigate its impact through rapid diagnosis, isolation of cases, and vaccination (Gerdil, 2003). Among healthy adults, influenza vaccine provides protection from infection, even when the circulating viruses do not exactly match the vaccine viruses. Unfortunately, supply limitations and the cost of vaccines put them out of reach of most populations worldwide. Other measures, such as good husbandry practices, can be supported through guidelines published by WHO and World Animal Health Organization.

Third, influenza can still cause significant disease burdens even when the preceding measures are implemented, so it requires *effective public health responses*. Seasonal epidemics are estimated to result in 3 to 5 million cases of severe illness each year, and 250,000 to 500,000 deaths annually. The morbidity and mortality for pandemic influenza vary depending on the virulence of the virus involved; for example, mortality from this cause was approximately 575,400 deaths in 2009 but 50 million to 100 million deaths in 1918–1919. The infrequency of influenza pandemics, combined with the potentially major severe public health impacts of such events, pose challenges for preparedness planning. The role of GHG, in this respect, focuses on enhancing the surge capacity of national-level health systems to cope with increased demands for diagnostic and clinical treatment, notably control of infection and administration of antiviral drugs. This effort is guided by the Pandemic Influenza Preparedness (PIP) Framework adopted by WHO member states in 2011 following growing concerns about the risks from highly pathogenic avian influenza (HPAI). More broadly, influenza governance seeks to maintain the functioning of societies, including public services and economic activity.

Finally, *public communication* is a key function of global influenza governance. Accurate and timely information is essential for ensuring an appropriate perception of risk among the public. This task is especially challenging during influenza pandemic because when and where it begins, which specific strain emerges, and how severe the health impact is can be unknown. An unduly high level of risk perception can prompt irrational behavior, which then adversely affects collective interests. The private stockpiling of antiviral drugs, for example, contributes to shortages in world supply. Maintaining a high level of alert can lead to "risk fatigue" and public skepticism when a pandemic does not materialize. At the same time, failure to raise sufficient awareness and concern may create problems in securing needed resources or public compliance with response measures.

(continues)

EXHIBIT 21-2 The Global Governance of Pandemic Influenza *(continued)*

Today, surveillance and reporting is the most developed function under global influenza governance, although data gaps remain for many LMICs. Web-based monitoring and reporting systems, integrating both state and non-state sources, and new technologies (e.g., web trawling) have further enhanced the delivery of this function. Global influenza governance remains most vulnerable in relation to the three core functions of preventive measures, response, and public communication. Despite recognition of the need to implement the PIP Framework, much of the effort to prepare for pandemic influenza remains focused at the national level. Pharmacologic interventions are, at present, available in only some countries. In addition, the stockpiling of antiviral medications and vaccines by individual countries causes shortages and increased prices worldwide. This practice is especially problematic if such drugs are needed, for example, to contain an outbreak during the initial stages. By undermining GHG capacity to ring-fence an outbreak, governments can actually reduce the health security of their domestic populations. As Coker and Mounier-Jack (2006, p. 889) argue, "The next pandemic will test notions of global solidarity."

Excerpted from Lee, K., & Fidler, D. (2007). Avian and pandemic influenza: Progress and problems for global governance. *Global Public Health* 2(3): 215.

recognition of the importance of *netpolitik* and *media-politik* (in contrast to *realpolitik*), a "new style of diplomacy that seeks to exploit the powerful capabilities of the Internet to shape politics, culture, values, and personal identity" (Bollier, 2003, p. 2).

Global change, in turn, is creating new problems ripe for collective action (e.g., climate change, population migration, economic instability, disease pandemics) through foreign policy and, consequently, diplomats. The new diplomacy agenda, then, includes a broader range of issue-areas deemed relevant to foreign policy (McInnes & Lee, 2006). This has given rise to new specialty areas of diplomacy such as *resource diplomacy* (the cultivation of relations with resource-rich countries), *Internet diplomacy* (negotiation of rules governing the Internet), and *disaster diplomacy* (understanding and addressing risks in a complex global system).

It is within this context that growing attention has been paid to global health diplomacy. Much of the GHD literature is overtly normative in advocating the use of global health activities to further foreign policy. For example, the U.K. government's *Health Is Global Strategy* seeks to "use health as an agent for good in foreign policy, recognizing that improving the health of the world's population can make a strong contribution towards promoting a low-carbon, high-growth global economy" (United Kingdom Department of Health, 2008). Similarly, Suleman et al. (2014, p. 1) propose that "[t]houghtful Health Diplomacy . . . has the potential to bridge the perceived divides between Western and predominantly Muslim nations." In the United States, GHD is often cast as a counterpart to military-backed "hard power" in the search for "what other tools are available to advance U.S. interests in the world" ("Health Diplomacy," 2007, p. B4).

In summary, GHD can be defined as "policy-shaping processes through which States, intergovernmental organizations, and non-state actors negotiate responses to health challenges or utilize health concepts or mechanisms in policy-shaping and negotiation strategies to achieve other political, economic, or social objectives" (Smith, Lee, & Fidler, 2009, p. 1). Such processes recognize that the changing roles and responsibilities of the increasingly diverse public and private actors concerned with global health require a range of approaches to collective action. Of significance is the absence of an overarching authority to adopt and enforce legally binding measures. Yet the world's experiences with severe acute respiratory syndrome (SARS) and H1N1 influenza, for example, have reemphasized the shared nature of global health challenges. To date, the focus has largely centered on negotiating global governance mechanisms to deal with acute public health threats—notably, infectious diseases outbreaks. However, greater attention needs to be given to how state and non-state actors at different policy levels can work more effectively together to address other global health issues, such as strengthening of health systems, health worker migration, access to medicines, and prevention and control of the rapid increase in chronic diseases.

Over the past six decades, WHO has been at the forefront of global health diplomacy as the United Nations' specialized agency for health. The World Health Assembly (WHA) has served as a valued forum for debating issues and encouraging consensus among member states. The post–Cold War era, however, has seen the rise of the G8 (reduced to G7 with suspension of Russia since 2014) countries as a core influence in international relations. Since the 2000s, the rising influence of the BRICS countries, along

with other "emerging economies," has been a notable development on the world stage. The most remarkable change among these countries is the transformation of China from an aid recipient to a leading aid donor over the past three decades. While there are limited official data sources on Chinese global health funding, a study by Grepin et al. (2014) reports that health has increased as a development aid priority for China. This change in perspective is reflected in the steady increase in the number of health, population, water, and sanitation projects supported in Africa since 2000, with China ranking among the top 10 bilateral global health donors to that continent. Beyond bilateral aid, China has been an active participant in the annual BRICS Health Ministers meetings that have held since 2011. These meetings include six roundtables and two Ministerial Forums on China–Africa Health Development, involving 40 African countries as well as representatives from the African Union, WHO, and UNAIDS (Röhren, 2017). In January 2017, China and WHO signed a memorandum of understanding on health issues related to the so-called Belt and Road Initiative, a monumental development strategy focused on strengthening land and sea trade routes between Europe and China. The agreement deals with health emergencies and with the certification of Chinese medicines and vaccines. This rapid growth of China's role in global health, in large part driven by the country's foreign and economic policy goals, has led to observations that China will soon overtake the United States as "the next leader in global health" (Dahl, 2017).

During the 21st century, it is likely that further geopolitical shifts will lead emerging economies, individually and collectively, to have greater prominence in GHD. The New Development Bank, formed by BRICS countries in 2014, intends to pursue the objective of "financing infrastructure and sustainable development projects in BRICS and other emerging economies and developing countries, complementing the efforts of multilateral and regional financial institutions toward global growth and development" (New Development Bank, n.d.). The G20 (the world's 20 leading industrial countries and emerging economies) is also poised to take a more active global health role. Its Berlin Declaration, issued in May 2017, recognizes health as "one of the most valuable resources for building a sustainable future" (Group of 20, 2017). The declaration, which follows the first G20 Health Ministers Meeting, focuses on antimicrobial resistance and health systems strengthening.

Along with state-based diplomacy, as discussed earlier in this chapter, global health actors embrace a broad range of non-state actors. For example, watching the G20 closely has been a coalition of civil society organizations known as the C20, which aims to facilitate "a structured and sustained exchange of critical reflection and political perspectives amongst civil society in G20 countries and beyond on the G20 agenda" (C20, n.d.). The diversity of actors concerned with global health is extended further by the influence of other sectors, including trade, security, environment, migration, and agriculture, upon the health sector. This is illustrated by the negotiation process to move from the MDGs to SDGs (**EXHIBIT 21.3**). Together, the greater diversity of actors and the complexity of issues gives the role of GHD even greater importance (Kickbusch & Kökény, 2013). Far greater understanding is needed concerning how GHD can best be conducted, which skills are needed for effective negotiation, and which ends GHD should seek to achieve. In response to calls for more information on these topics, there has been a blossoming of GHD literature and training programs focused on the skills and processes needed for the negotiation of global health-related agreements (Kickbusch & Kökény, 2013). As former WHO Director Margaret Chan (2007) noted, health negotiators need to assert themselves more effectively in new policy arenas:

> [D]ue to the impact of globalization on public health, a new type of diplomacy is necessary to navigate the changing landscape of international affairs and politics. The emergence of cross-border disease, bio-terrorism, shifting geopolitical environments, and the linkages between health, trade, intellectual property, and human rights, present stakeholders with a complex matrix of technical and relational challenges.

Key Tasks for Strengthening Global Health Governance

Debates over the past two decades about the present weaknesses of GHG have often focused on dissatisfaction with specific international organizations' willingness and ability to fulfill their mandates, notably WHO. A substantial amount of intellectual and practical energy has been expended searching for effective options for reforming, rebuilding, or even replacing WHO. From concerns during the mid-1990s about weak leadership, lack of nimbleness, and poor leadership, to the crisis of confidence following the Ebola virus outbreak of 2013–2016, there are clear frustrations with the process of "fixing" WHO. Even the reform recommendations prompted by the Ebola

EXHIBIT 21-3 Negotiating the Role of Health Within the UN Sustainable Development Goals

The 2030 Agenda for Sustainable Development was adopted by the UN General Assembly in September 2015 to replace the Millennium Development Goals (MDGs) as the central UN platform for achieving "integrated and indivisible" development across three dimensions: social, environmental, and economic. Encompassing 17 Sustainable Development Goals (SDGs) and 169 targets, which require national, regional, and local efforts across all sectors of society, the purpose of the SDG agenda is to serve as a broad and inclusive framework for ending poverty worldwide.

The SDGs differ from the MDGs in two important respects. First, the UN Secretary General's High-Level Panel on Sustainable Development highlights the importance of addressing the determinants of development and well-being within a "universal framework" in which goals apply to every country and across all sectors of society. While the MDGs applied to developing countries, the SDGs are framed to address poverty alleviation in all countries. Second, the SDGs place sustainability at the heart of the development agenda, recognizing the need to address the complex links between development and the environment. Of particular concern is the need to move away from a narrow set of quantitative goals and targets and toward a broader range of more "integrated and indivisible" goals and targets.

Before consensus could be achieved on these differences, however, negotiators had to navigate a broad range of sector-specific interests. This included the health sector, which enjoyed particular prominence under the MDGs. Three out of eight MDGs focused directly on health-related issues: reducing child mortality (MDG 4), improving maternal health (MDG 5), and combating HIV/AIDS, malaria, and other diseases (MDG 6). Three others were indirectly related to health: eradicating extreme poverty and hunger (MDG 1), ensuring environmental sustainability (MDG 7), and developing a global partnership for development (MDG 8). This emphasis arose because, at the time the MDGs were negotiated during the late 1990s, major donor agencies heavily favored support for addressing global health needs. During this period, increased funding was directed to global health, with the sector receiving substantial new resources and political support (Nunes, Lee, & O'Riordan, 2016).

A detailed comparison of the negotiation of the MDGs and SDGs is difficult given the "absence of contemporaneous, empirical documentation of the agenda-setting and decision-making process resulting in the MDGs" (Brolan & Hill, 2016, p. 514). Nevertheless, it appears that the processes were different. The MDGs arose from the Millennium Summit, described as the "largest gathering of world leaders in history" (UN Millennium Project, 2006). According to McArthur (2014, p. 7), the text of the UN Millennium Declaration was the product of an "intergovernmental drafting process . . . led by John Ruggie, Kofi Annan's advisor and assistant secretary-general. Mark Malloch Brown, the UNDP administrator. . . . In the end, world leaders signed off on a historic Millennium Declaration text that distilled a wide-ranging global agenda down to a relatively pithy framework of global priorities. . . . The text was ultimately drafted in a UN conference room, but its contents had roots in the outcomes from the 1990s conferences."

While the SDGs were supported by almost 200 UN member states, they were the product of a process facilitated by a Sustainable Development Solutions Network (SDSN), overseen by a Leadership Council, operating "under the auspices of the UN Secretary-General . . . [to mobilize] global scientific and technological expertise to promote practical solutions for sustainable development." The SDSN formed 12 Thematic Groups (TGs), including the Thematic Group on Health for All, whose members comprised leading scientists, engineers, academics, and practitioners from civil society and the business community (SDSN, 2014). As Wagner (2015) describes:

> Several elements combined to deliver a different negotiation process on the SDGs. A critical change was the fact that North–South differences were not as pronounced. The SDG negotiation process was conducted in a manner that reduced delegation rigidity, both of individual member states and within coalitions. Based on the Rio+20 instructions for how the SDGs would be developed, negotiations were conducted by an "Open Working Group" [OWG] in which 70 countries developed a sharing arrangement for the designated 30 "seats" for participants. The sharing arrangement broke up traditional coalitions, and facilitated discussions in which seat partners sought to identify what they shared in common with each other's position, rather than to strategize over how to elevate their different positions.

This new negotiating format led to a shift away from the prominence previously given to the health sector. During the negotiations, some argued that the MDGs had been too focused on quantifiable targets, which were closely associated with health targets such as reducing child mortality rates; those targets then became goals in themselves, rather than achieving overall development. As Hill et al. (2014, p. 1) describe, the "global context and framing of the new agenda is substantially different, and health advocates cannot automatically assume the same prominence." Instead, health needs to be reframed within a social sustainability paradigm, be universally relevant to all countries, and be asserted across all themes, rather than being identified as stand-alone goals and targets. On this basis, they suggest that "health advocates need to overtly explore what global governance structures will be needed to finance and implement these universal Sustainable Development Goals" (p. 1).

The end result of the negotiation process was that, among the 17 SDGs, only one is directly a health goal (SDG 3) including universal health coverage. For some, this outcome signals a downgrading of health on the global agenda. For others, the broader approach represents an improvement over the MDG targets, but questions remain about its achievability without a clear commitment to the right to health, collective responsibility (beyond individual societies) to uphold this commitment, and accountability mechanisms to ensure the delivery of the right to health as an entitlement (Go4Health, 2013).

outbreak (**EXHIBIT 21-4**)—an event in which WHO's conduct faced unprecedented criticism—have once again led to disappointment that real change remains elusive (Horton, 2015).

WHO is not alone in drawing reformers' attention: Other international organizations have also faced criticism. For example, the impacts on health equity and status in LMICs of the World Bank's market-driven policies and conditionalities have raised major concerns since the early 1990s (Birn & Dmitrienko, 2005). In 2011, the GFATM faced criticism regarding its governance and financial oversight, confirmed by findings of a high-level independent review panel. The review, chaired by former U.S. Health Secretary Michael Leavitt and former President of Botswana Festus Mogae, acknowledged the important work and achievements of the Global Fund, but noted that inadequate fiduciary controls resulted in misappropriation of funds in recipient countries (Boseley, 2011).

Beyond the governance of individual organizations, many challenges stem from the way that existing institutional arrangements together serve to govern global health. As discussed in this chapter, the need to strengthen collective action has been driven by impacts wrought by globalization (e.g., technological change, increased capital flows, intensifying population mobility) that existing forms of governance cannot address in an effective manner. Can existing bodies, individually and collectively, govern in ways that meet the health needs of a globalizing world, or is there need to design a new "system"? The latter task, of achieving a better "system" of GHG, must resolve a number of challenges.

Which Normative Frameworks Should GHG Seek to Uphold?

Any redesign of GHG requires agreement among those governed about the shared values and ethics underlying collective action and institution building. The normative frameworks shaping global affairs are, of course, diverse and sometimes at odds. Nevertheless, a substantial part of the global health community has moved toward the adoption of some values as the starting point for GHG, beginning with the basic right to health. A commitment to addressing health inequities, within and across countries, and to building universal health coverage, also forms important parts of the SDGs. What does fairness and justice look like in GHG?

Which Core Functions Should GHG Fulfill?

Among the many functions that can be performed by global governance (Table 21-1), there is a need for agreement on which functions should form part of GHG, and how they should be carried out. Today, health governance is exercised at many different institutional levels: local/subnational (e.g., district health authority), national (e.g., ministry of health), regional (e.g., Pan American Health Organization), international (e.g., WHO), and global (GFATM). Should GHG be considered residually, as comprising only those functions that cannot be performed by other levels of health governance? Or should GHG be considered holistically, as comprising all levels of health governance scaffolded in an interconnected and complementary way? For both visions of GHG, it is clear that building stronger global institutions is not a zero-sum game, whereby new institutional arrangements necessarily seek to replace existing ones. Rather, by focusing on the functions to be performed, effective GHG could be viewed as an enabling structure built upon strong institutions from the ground up.

What Should Be the Relative Roles of State and Non-state (For-Profit and Not-for-Profit) Actors?

This chapter has described how GHG increasingly involves state (e.g., ministry of health) and non-state (e.g., International Federation of Pharmaceutical Manufacturers Association) actors, sometimes operating separately, but increasing working in combination (e.g., Project Last Mile, Malaria for Medicines Venture). Pragmatism has been a major factor in the proliferation of global public–private partnerships. However, their roles have also raised questions about whose interests are served by GHG. Can GHG serve

EXHIBIT 21-4 Ten Recommendations for Strengthening Global Health Governance After the 2013–2016 Ebola Virus Outbreak

Recommendation 1: Develop a global strategy to invest in, monitor, and sustain national core capacities.
WHO should convene governments and other major stakeholders within 6 months to begin developing a clear global strategy to ensure that governments invest domestically in building core capacities and to mobilize adequate external support to supplement efforts in poorer countries.

Recommendation 2: Strengthen incentives for early reporting of outbreaks and science-based justifications for trade and travel restrictions.
Political leaders, governments, and international organizations must strengthen the set of incentives and disincentives so that governments report disease outbreaks early. Among these should be stronger disincentives for implementing trade and travel restrictions without a scientific or public health basis.

Recommendation 3: Create a unified WHO Center for Emergency Preparedness and Response with clear responsibility, adequate capacity, and strong lines of accountability.
High-level political leaders must clearly designate who is responsible for responding when disease outbreaks outstrip national capacities, invest in the capacity to respond, and ensure accountability for fulfillment of these responsibilities.

Recommendation 4: Broaden responsibility for emergency declarations to a transparent, politically protected Standing Emergency Committee.
Member states should amend the International Health Regulations to broaden responsibility for declaring a public health emergency of international concern. The Director-General convenes, and is advised by, an ad hoc Emergency Committee constituted from a list of independent experts; however, authority and responsibility to declare a public health emergency of international concern rest exclusively with the Director-General. We recommend the creation of a Standing Emergency Committee that meets regularly, with the mandate to declare a public health emergency of international concern by a majority vote of its members. The emergency declaration should trigger other actions, such as financial disbursements by development banks, emergency data-sharing and specimen-sharing rules, and emergency regulatory procedures for new drugs, vaccines, and diagnostics (recommendations 6 and 7). The Director-General should chair, communicate, and explain the Standing Emergency Committee's decisions. Following an open call for nominations, the Director-General would appoint the first members; thereafter, the Standing Emergency Committee itself would periodically vote in new members to preserve its independent character. Minutes and votes of Standing Emergency Committee members should be published immediately following each meeting for the sake of transparency, to build external confidence, reduce political interference, and strengthen the committee's hand against resistant states. Similarly to other institutions responsible for technically complex, yet politically consequential decisions, such as central banks or drug regulatory authorities, the Standing Emergency Committee must be protected from political pressure that might interfere with its judgment.

Recommendation 5: Institutionalize accountability by creating an independent Accountability Commission for Disease Outbreak Prevention and Response (Accountability Commission).
The UN Secretary General should create an Accountability Commission as an independent body composed of civil society, academia, and independent experts doing real-time and retrospective system-wide assessment of global responses to major disease outbreaks. The Accountability Commission would track and analyze the contributions and results achieved by national governments, donors, UN agencies, international and national nongovernmental organizations, and the private sector. All major actors would be expected to share information promptly with the Accountability Commission about financial, in-kind, or operational contributions; the Accountability Commission should publish the names of organizations unwilling to share such information. The Accountability Commission would assess aid effectiveness, including funds committed, paid, disbursed, and spent; both short-term and long-term accomplishments achieved with those funds; and the timeliness, effectiveness, cultural appropriateness, and equity of the response for intended beneficiaries. The Accountability Commission should liaise directly with and provide a forum for representatives of communities directly affected by outbreaks. Finally, it should monitor efforts to build and sustain national core capacities.

Recommendation 6: Develop a framework of rules to enable, govern, and ensure access to the benefits of research.
Before the 2016 World Health Assembly, WHO should convene governments, the scientific research community, industry and nongovernmental organizations to begin developing a framework of norms and rules for research relevant to disease outbreaks. The framework's goal would be to provide guidance on three interrelated issues: (a) access to data and samples to enable and accelerate research; (b) improved ethical standards; and (c) equitable access to the benefits of research such as priority and affordable access to newly developed technologies and treatments.

Recommendation 7: Establish a global facility to finance, accelerate, and prioritize research and development.
The UN Secretary General and the WHO Director-General should convene in 2016 a high-level summit of public, private, and not-for-profit research funders to establish a global financing facility for research and development for health technology relevant for major disease outbreaks. The facility would support manufacturing, research, and development for drugs, vaccines, diagnostics, and other nonpharmaceutical supplies (such as personal protective equipment) where the commercial market does not offer appropriate incentives. For known pathogens, the facility could invest in bringing candidate drugs, vaccines, technology platforms, and other relevant products through proof of concept, phase 1, and phase 2 testing in humans, so that they are ready for wider testing, manufacturing, and distribution when an outbreak strikes. During an outbreak the facility would rapidly mobilize finance for priority research and development projects, such as diagnostics for novel pathogens.

Recommendation 8: Sustain high-level political attention through a Global Health Committee of the Security Council.
In recognition of health as an essential facet of human and national security, the UN Security Council should establish a Global Health Committee consisting of government representatives. The Committee's main goal would be to expedite and elevate political attention to health issues posing a serious risk to international peace and security and provide a prominent arena to mobilize political leadership. Specifically, the Committee would monitor and publish an annual report on progress in building a strong and effective global health security system, taking into account analyses from the Accountability Commission and WHO. The Committee would also address alleged noncompliance with International Health Regulation provisions on trade and travel measures. The Committee would not declare public health emergencies of international concern. That decision would remain technically driven and under the authority of WHO. The Committee would not be able to veto WHO decisions or reports of the Accountability Commission. Rather, the Committee's main role would be as an arena for high-level attention to health threats and a forum for problems not adequately resolved by the WHO governing bodies.

Recommendation 9: A new deal for a more focused, appropriately financed WHO.
To rebuild trust, respect, and confidence within the international community, WHO should maintain its broad definition of health, but substantially scale back its expansive range of activities to focus on core functions. The scope of WHO's work would thus continue to embrace the full range of health issues, but its functions should be far more circumscribed. We restrict our analysis to core functions in infectious disease outbreaks. However, there remains the need to define WHO's core functions in other key areas of work, such as noncommunicable diseases, injuries, environmental health, health systems, and social determinants of health. For this purpose, the January 2016 Executive Board should launch a fundamental review of the organization's constitution and mandate to define its core functions. This review should identify and hand over noncore activities to other actors, thereby streamlining WHO's activities. It should also examine which core functions are not being fulfilled or adequately funded.

Recommendation 10: Good governance of WHO through decisive, time-bound reform, and assertive leadership.
Restoring credibility demands that WHO institutionalizes accountability mechanisms, strengthens and clarifies how it works with other actors, and fosters strong leadership. The January 2016 Executive Board should launch a process to implement four new policies for WHO to meet basic principles of good governance: establish a freedom of information policy, with appropriate safeguards; create a permanent Inspector General's office to monitor overall performance of the organization and its entities, reporting to the Executive Board; conclude continuing work on the Framework of Engagement with Non-State Actors to better govern the way WHO interacts with civil society, academia, foundations, and the private sector; and revise human resources policies to attract or retain well-qualified staff, including for leadership positions, while letting go of chronic underperformers.

public interests with the participation of both state and non-state actors? Which institutional arrangements are needed to ensure appropriate "checks and balances" to protect public interests in GHG? The adoption of the WHO Framework for Engagement with Non-State Actors (FENSA) in May 2016 followed a long and "difficult gestation" (Buse & Hawkes, 2016) amid concerns regarding the organization's relationship with the private for-profit sector (**EXHIBIT 21-5**). While FENSA "recognizes the risks of potential conflicts of interest from engagement with non-state actors, including undue influence in setting or applying policies, norms, and standards," and "WHO and its governing body have taken an important step in democratizing the invite list to the policy table and establishing the dining etiquette," (p. 5) Buse and Hawkes (2016, p. 5) argue that this was a lost opportunity for the organization to "leverage its mandate and authority to address the larger issue of governing the activities of industry."

EXHIBIT 21-5 WHO Framework of Engagement with Non-State Actors

Introduction

1. The overarching framework of engagement with non-state actors and the WHO policy and operational procedures on management of engagement with non-state actors apply to all engagements with non-state actors at all levels of the Organization, whereas the four specific policies and operational procedures on engagement are limited in application to, respectively, nongovernmental organizations, private sector entities, philanthropic foundations and academic institutions.

Engagement: Rationale, Principles, Benefits, and Risks

Rationale

2. WHO is the directing and coordinating authority in global health in line with its constitutional mandate. The global health landscape has become more complex in many respects; among other things, there has been an increase in the number of players including non-state actors. WHO engages with non-state actors in view of their significant role in global health for the advancement and promotion of public health and to encourage non-state actors to use their own activities to protect and promote public health.
3. The functions of WHO, as set out in Article 2 of its Constitution, include: to act as the directing and coordinating authority on international health work; to establish and maintain effective collaboration with diverse organizations; and to promote cooperation among scientific and professional groups which contribute to the advancement of health. The Constitution further mandates the Health Assembly or the Executive Board, and the Director-General, to enter into specific engagements with other organizations. WHO shall, in relation to non-state actors, act in conformity with its Constitution and resolutions and decisions of the Health Assembly, and bearing in mind those of the United Nations General Assembly or the Economic and Social Council of the United Nations, if applicable.
4. WHO's engagement with non-state actors supports implementation of the Organization's policies and recommendations as decided by the governing bodies, as well as the application of WHO's technical norms and standards. Such an effective engagement with non-state actors at global, regional, and country levels, also calls for due diligence and transparency measures applicable to non-state actors under this framework. In order to be able to strengthen its engagement with non-state actors for the benefit and interest of global public health, WHO needs simultaneously to strengthen its management of the associated potential risks. This requires a robust framework that enables engagement and serves also as an instrument to identify the risks, balancing them against the expected benefits, while protecting and preserving WHO's integrity, reputation, and public health mandate.

Principles

5. WHO's engagement with non-state actors is guided by the following overarching principles. Any engagement must:
   a. demonstrate a clear benefit to public health;
   b. conform with WHO's Constitution, mandate, and General Programme of Work;
   c. respect the intergovernmental nature of WHO and the decision-making authority of member states as set out in the WHO's Constitution;
   d. support and enhance, without compromising, the scientific and evidence-based approach that underpins WHO's work;
   e. protect WHO from any undue influence, in particular on the processes in setting and applying policies, norms, and standards;
   f. not compromise WHO's integrity, independence, credibility, and reputation;
   g. be effectively managed, including by, where possible, avoiding conflict of interest and other forms of risks to WHO;
   h. be conducted on the basis of transparency, openness, inclusiveness, accountability, integrity, and mutual respect.

How Should GHG Intersect with, or Be Integrated with, Other Spheres of Governance?

Health determinants and outcomes, in a globalizing world, are affected by a broad range of factors. As a consequence, effective GHG cannot be limited to the health sector, but rather must operate within a larger ecosystem of global governance. How should GHG engage with non-health sectors (e.g., trade, environment, law enforcement, education, transportation)? How can this be achieved at all levels of health governance to achieve policy coherence (Silberschmidt & Zeltner, 2013)? The formulation of the SDGs has adopted this approach and offer opportunities to embed GHG more deeply in other sectors. Similarly, *The Lancet*–University of Oslo Commission on Global Governance for Health proposed a UN Multistakeholder Platform on Global Governance for Health that would "engage governments, intergovernmental organizations (in the areas of finance, trade, labor, food, environment, human rights, migration, and peace and security), and non-state actors including civil society, academic experts, and business" (Ottersen et al., 2014, p. 630). The Platform (**FIGURE 21-5**) would address the problem of what the Commission calls "institutional stickiness," whereby it becomes "difficult to reform institutions to evolve with the times" because power becomes entrenched. The Commission has argued that the Platform would enable "more inclusive, better integrated, and more coherent policy dialogue across institutions and arenas."

How Should Decisions Be Made Within a System of GHG?

Decision-making processes are central to governance—that is, who participates and how decisions are made. International health governance gives formal power and authority for decision making largely to state actors. This chapter describes how non-state actors have become increasingly involved in global health and, to a growing extent, in decision making, both formally and informally. Proponents argue that this "opening up" of participation enables a broader range of stakeholders to be represented in GHG decisions and, by extension, facilitates better decisions. Others, however, question whether more voices are necessarily the right voices. To what extent are the voices of big business and CSOs necessarily representative of local people, notably the poor and vulnerable? More voices also do not necessarily mean better decision making. Indeed, lessons from the Occupy Movement and the UN Climate Change Conference suggest that too many diverse voices coalescing around "amorphous structures" can be a hindrance to effective global change (Klein, 2014). Who should be enfranchised in decision making and how should they meaningfully participate in GHG? How can dissenting voices be

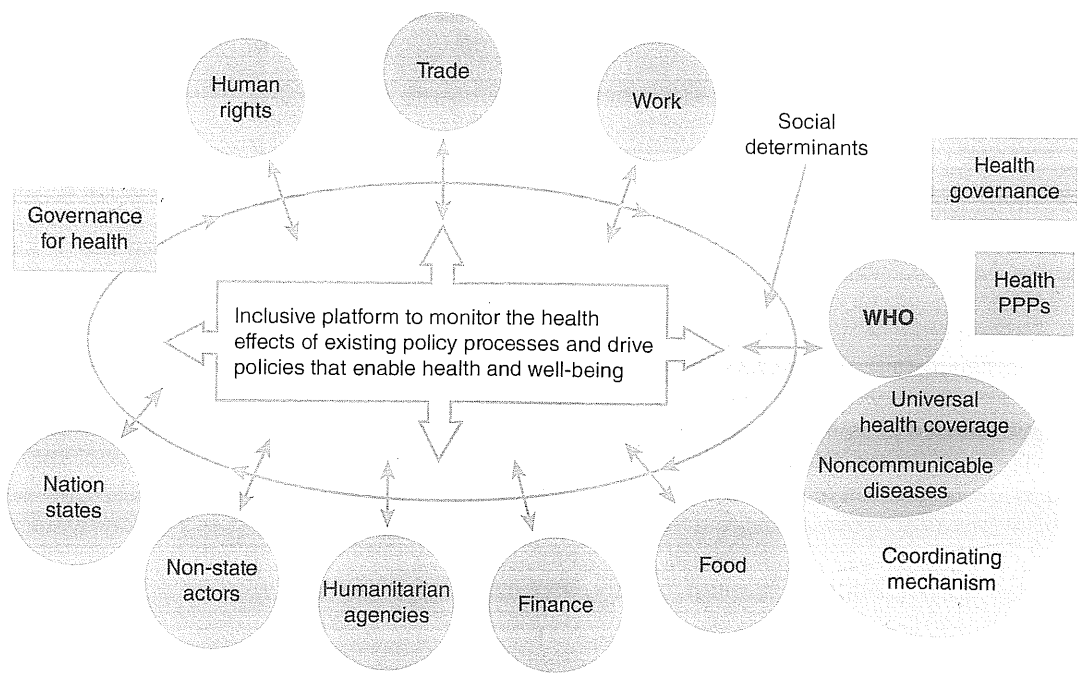


FIGURE 21-5 United Nations stakeholder platform.

Reprinted from Ottersen, O., Dasgupta, J., Blouin, C., Buss, P., Chongsuvivatwong, V., Frenk, J., . . . Scheel, I. (2014). The political origins of health inequity: prospects for change. Report of *The Lancet*-University of Oslo Commission on Global Governance for Health. *The Lancet, 383*, 630–667. Copyright © 2014, with permission from Elsevier.

heard but, most importantly, reconciled in ways that allow legitimate collective action?

Ultimately, the challenges faced by GHG cannot be reduced to technical or administrative fixes. If only a new vaccine could be developed, if only new technology could be applied more widely, if only a financial oversight committee could be formed to watch over the disbursing of available resources—these are all important achievements in GHG but will not deliver the kinds of changes needed. The key challenges in GHG are fundamentally political: They do not deal with interferences with scientific or rational action, but rather with building institutions that enable the agreed exercise of power for collective action. The proposal to create a Committee C (**EXHIBIT 21-6**), for example, would retain the primary role of WHO member states, while enabling "major stakeholders in global health—international agencies, philanthropic organizations, multinational health initiatives, and representatives from major civil-society groups, particularly those who legitimately represent the most vulnerable populations"—to feed more actively into state-led decision making (Silberschmidt, Matheson, & Kickbusch, 2008, p. 1485).

Supporting Institutional Innovation in Global Health Governance

As described in the previous section, while there is broad agreement that existing institutions face many problems, agreed ways of moving forward to address them are lacking. Proposals to strengthen GHG to date have ranged from the reform of selected international organizations (notably focused on WHO) to the design of an entirely new GHG architecture. On the one hand, numerous, and largely unsuccessful, efforts to "fix" WHO since the 1990s have produced "reform fatigue." On the other hand, the design of an entirely new system has not been supported by a clear and agreed vision of what it should look like (Gill & Benatar, 2016; Lee & Pang, 2015; Youde, 2012).

To get beyond this impasse, after so much debate and numerous initiatives, a potentially useful way forward is to draw on thinking about institutional innovation. Institutional innovation is defined by Raffaelli and Glynn (2015, p. 1) as "novel, useful, and legitimate change that disrupts the cognitive, normative or regulative mainstays of an organizational field." Institutional innovation can occur along a continuum ranging from incremental change within existing institutions (modification) to more radical change in the form of creating new institutions (disruptive innovation). Institutional innovation theory has received substantial attention in business studies in the context of explaining success and failure in companies' adaptation to fast-paced globalization. Thus, by the mid-2000s, institutional theory had shifted from a focus on explaining stability, permanence, and homogeneity, to increased attention to change and variation.

EXHIBIT 21-6 Proposal to Create a Committee C of the World Health Assembly

Currently the formal work of the WHA is focused on determining the policies of WHO itself and on making recommendations for member states. The assembly is the key annual event of global health, sometimes more because of the many informal and formal side-meetings than for its agenda. The consequence is that many major decisions in global health are taken unlinked to the formal business of the assembly. . . . The mechanism we propose is to consider the establishment of a committee C of the WHA. This committee would debate major health initiatives by other key players in the global-health arena. It would provide the opportunity for these organizations to present their plans and achievements to the delegates of the WHA and the nongovernmental organizations in official relations with WHO. It would also provide an opportunity to address coordination and common concerns of different partners in global health. Organizations wishing to make use of this mechanism would send their proposal to WHO's executive board, which would set the agenda for this committee as it does with the existing committees.

A committee C would need rules of procedures that give sufficient space to the other groups involved while fully respecting the role of governmental delegations. This double requirement could be met by proposing resolutions for adoption by the plenary of WHA as in committees A and B, but to explicitly welcome within such resolutions commitments independently taken by other partners that would be annexed to the resolution (panel). With such a procedure the other entities keep their full independence by autonomously adopting—according to their internal rules—their declarations to be annexed. There is an interaction between the member states and the other entities in committee C on the conditions and methods under which to annex a declaration and the core of the resolution. Member states keep their sovereignty in the final adoption of the resolution in the WHA plenary where other stakeholders cannot vote or intervene.

Institutional innovation has so far received limited attention in the study of public institutions, particularly international organizations. Nevertheless, some examples can be cited of institutional innovation occurring to support GHG in response to the disconnect between the forms of governance needed in a globalizing world and the institutional arrangements presently available (Smith & Lee, 2017).

One important example is innovative financing mechanisms. The two traditional sources of healthcare financing at the national level have largely been various forms of taxation and out-of-pocket payments. At the international level, financing of health governance functions has been through assessed contributions by governments according to their size and ability to pay (a form of taxation) and voluntary donations from individuals, states, and non-state actors. While funding for global health initiatives increased to unprecedented levels from the late 1990s until the global financial crisis beginning in 2008, available resources have fallen short of need. Where available funds through these two sources have not been sufficient, innovative financing mechanisms have been developed. Many alternative financing mechanisms have emerged to fill the funding gap, such as taxation of global transactions (e.g., air travel, foreign currency exchange) and crowdsourcing. Relatedly, efforts to reduce the costs of global health activities have led to important innovations such as forward purchasing, generic pricing, and guaranteed contracts.

Another area where institutional innovation is occurring is disease surveillance, monitoring, and reporting using web-based technologies. In some ways, strengthening existing capacities is likely to be most appropriate in this area of focus. A good example is the revised International Health Regulations (2005). To prevent smaller-scale outbreaks from becoming larger-scale emergencies, all WHO member states need to have a minimum level of core capacities to detect, report, and respond to such events rapidly. Governments agreed to develop these core capacities by 2012 under the revised IHR following the SARS outbreak of 2002–2003. A failure to meet this deadline by many countries led to an extension of the target time frame to 2014. Following the Ebola virus outbreak, the deadline was further extended to 2019 (Moon et al., 2015). As of 2016, and based on self-assessments, approximately half of WHO member states had yet to comply, exposing the world to similar risks in future (Lillywhite, 2016).

To support these efforts, the Global Health Security Agenda (GHSA) was launched in 2014 "to advance a world safe and secure from infectious disease threats, to bring together nations from all over the world to make new, concrete commitments, and to elevate global health security as a national leadership priority." The GHSA was subsequently endorsed by the G7, with the governments of Finland and Indonesia hosting commitment development meetings (see the *Public Health Infrastructure* chapter for more information on the GHSA). A 10-year strategic plan has also been set out by WHO to enable compliance by LMICs (WHO, 2016b). The overall lessons from the Ebola virus outbreak has been that noncompliance by LMICs needs to be addressed through financial support, rather than through changes to the IHR, which is considered "technically sound" (Lillywhite, 2016).

For other functions, however, innovations applying information and communication technologies (ICTs), open source learning, and big data offer opportunities to improve the capacity to identify, track, and even predict disease outbreaks of global concern. An early example of ICT-based innovation is ProMed (Program for Monitoring Emerging Diseases), an Internet-based reporting system established in 1994 to rapidly disseminate information on outbreaks of infectious diseases and acute exposures to toxins that affect human health, including those in animals and in plants grown for food or animal feed. ProMed currently reaches more than 70,000 subscribers in at least 185 countries. It is open to all sources of information, including media reports, official reports, online summaries, local observers, and ProMed subscribers. A team of expert human, plant, and animal disease moderators screen, review, and investigate reports before posting them to the network. Reports are then distributed by email to direct subscribers and posted immediately on the ProMed website (ProMed, n.d.).

The Global Public Health Intelligence Network operates in a similar way by identifying outbreaks from websites, news wires, and local and national newspapers retrieved through news aggregators. Global Pulse is a flagship initiative of the United Nations Secretary-General that is seeking to harness big data safely and responsibly as a public good. A good example of the innovative use of big data (extremely large data sets that require analysis computationally to reveal patterns, trends, and associations, especially related to human behavior and interactions) for global health is GermTracker (**EXHIBIT 21-7**).

Another example of institutional innovation has been representation in decision making. At the heart of GHG innovation is finding appropriate ways for decisions to be made collectively to identify and achieve shared goals. A longstanding concern with WHO has been the limited voice given to civil society organizations, which have become increasingly

EXHIBIT 21-7 GermTracker

Researchers at the University of Rochester showed last year how Twitter can be used to predict how likely it is for a Twitter user to become sick. They have now used Twitter to model how other factors—social status, exposure to pollution, interpersonal interaction, and others—influence health.

"If you want to know, down to the individual level, how many people are sick in a population, you would have to survey the population, which is costly and time-consuming," said Adam Sadilek, postdoctoral researcher at the University of Rochester. "Twitter and the technology we have developed allow us to do this passively, quickly, and inexpensively; we can listen in to what people are saying and mine this data to make predictions."

Many tweets are geo-tagged, which means they carry Global Positioning System (GPS) information that shows exactly where the user was when he or she tweeted. Collating all this information allows the researchers to map out, in space and in time, what people said in their tweets, as well as where they were and when they were there. By following thousands of users as they tweet and go about their lives, researchers also could estimate interactions between two users and between users and their environment.

Using tweets collected in New York City over a period of a month, the researchers looked at factors such as how often a person takes the subway, goes to the gym, or visits a particular restaurant; proximity to a pollution source; and online social status. They examined 70 factors in total. They then looked at whether these factors had a positive, negative, or neutral impact on the users' health.

Some of their results are perhaps not surprising. For example, pollution sources seem to have a negative effect on health. However, the study marked the first time that this impact has been extracted from the online behavior of a large online population. The paper also reveals a broader pattern, in which almost any activity that involves human contact leads to significantly increased health risks. For example, even people who regularly go to the gym get sick marginally more often than less active individuals. Nevertheless, people who merely talk about going to the gym, but actually never go (verified based on their GPS data), get sick significantly more often. Thus, interesting confounding factors can now be studied at scale.

The technology that Sadilek and his colleague Professor Henry Kautz developed has led to a web application called GermTracker. The application color-codes users (from red to green) according to their health by mining information from their tweets for 10 cities worldwide. Using the GPS data encoded in the tweets, the app can then place people on a map, which allows anyone using the application to see their distribution.

"This app can be used by people to make personal decisions about their health. For example, they might want to avoid a subway station if it's full of sick people," Sadilek suggested. "It could also be used in conjunction with other methods by governments or local authorities to try to understand outbursts of the flu."

During flu season, as the number of people with the flu across the United States increases, so do the number of people monitoring GermTracker. On some days in January, as many as 10,000 people visit http://fount.in where the app is hosted.

The model that Sadilek and his colleagues developed is based on machine learning. At the heart of their work is an algorithm that can distinguish between tweets that suggest the person tweeting is sick and those that do not.

"It's like teaching a baby a new language," Sadilek said. He explained that they first generated a training set of data—5,000 tweets that had been manually categorized and from which the algorithm can start to distinguish what words and phrases are associated with someone being sick. He added, "We need the algorithm to understand that someone who tweets 'I'm sick and have been in bed all day' should be characterized as sick, but 'I'm sick of driving around in this traffic' shouldn't be."

The application is also improving the algorithm. Every time users access the app and click on one of the colored dots that represent the tweeting users, they can see the specific tweet that led someone to be classified in a specific way. The application asks users to assess the tweet and say whether they agree with the classification. These data are fed back into the algorithm, which continues to learn from its mistakes.

University of Rochester. (2013). Using Twitter to predict the influence of lifestyle on health. http://www.rochester.edu/news/show.php?id=5532

important in global health activities. Historically, WHA has been the plenary body through which governments set priorities. Officially recognized non-state actors can be given observer status at the WHA, for example, but obtaining this status is a highly selective process controlled by states.

Overall, change has been too slow and too limited for many CSOs seeking to inject a more critical voice in WHO deliberations. The previously described limitations of WHO as an authoritative decision-making body raise the question of what kind of body is needed. Some have suggested an enhanced WHA through a committee C involving additional constituencies beyond member state delegations, such as CSOs, charitable foundations, and other non-state actors (Exhibit 21-6). The People's Health Assembly, a consortium of CSOs, was initiated by organizations that did not feel represented by existing institutional

arrangements, which focused on WHO and member states. The four *Global Health Watch* (2014) reports were published as an alternative to the *World Health Report* published by WHO—they sought to offer a critical voice. Each report was intended to serve as

> the definitive voice for an alternative discourse on health and health care. It covers a range of issues that currently impact on health, including the present political and economic architecture in a fast-changing and globalized world; a political assessment of the drive towards Universal Health Coverage; broader determinants of health, such as gender-based violence and access to water; stories of struggles, actions and change; and a scrutiny of a range of global institutions and processes. It integrates rigorous analysis, alternative proposals and stories of struggle and change to present a compelling case for a radical transformation of the way we approach actions and policies on health (Global Health Watch, 2014, Overview).

Conclusion

The health impacts of contemporary globalization are now widely documented, and are recognized as being more extensive and intensive than the impacts that occurred in earlier periods of social change. The resultant effects on health determinants and outcomes, affecting individuals and populations worldwide, pose fundamental challenges to how we govern health from the local level to the planetary level. "Global health" is now a widely used and accepted term, albeit one laden with imprecision and redundant meanings. A full transition in thinking and practice entails more than a change in nomenclature; it requires embracing a paradigmatic shift about health determinants and outcomes. An understanding of the distinct meaning of global health, in turn, leads to different expectations about collective active to govern the health impacts of globalization.

The transition from international to global health governance is also a work in progress, characterized by conceptual fuzziness and contested views about what should be achieved and how to achieve it. Numerous challenges remain to be addressed, but many opportunities are available to approach these challenges using institutional innovation. This is already beginning to happen, resulting in the strengthening of some GHG functions in selected issue areas. It is more likely that the global health community will continue to move incrementally in this way, rather than adopt a wholesale redesign of existing institutional arrangements.

Discussion Questions

1. Which core functions do you believe an effective system of global health governance should serve?
2. How might the concept of network governance be used to link together existing institutional arrangements for global health? Are there any governance gaps that need filling?
3. Which stakeholders should be involved in making decisions concerning global health? How should participation in decision making be governed?
4. Which functions might non-state actors perform in global health governance?

References

Aginam, O. (2005). *Global health governance, international law and public health in a divided world.* Toronto, Canada: University of Toronto Press.

Bayne, N., & Woolcock, S. (2007). *The new economic diplomacy: Decision-making and negotiation in international economic relations.* London, UK: Ashgate.

Beck, U. (2015). *What is globalization?* London, UK: Polity Press.

Benedick, R. E. (1998). Diplomacy for the environment. In American Institute for Contemporary German Studies, *Environmental diplomacy* [Conference report] (pp. 3–12). Washington, DC: Johns Hopkins University.

Birn, A. E. (2014). Philanthrocapitalism, past and present: The Rockefeller Foundation, the Gates Foundation, and the setting(s) of the international/global health agenda. *Hypothesis, 12*(1), e8. doi:10.5779/hypothesis. v12i1.229

Birn, A. E., & Dmitrienko, K. (2005). The World Bank: Global health or global harm? *American Journal of Public Health, 95*(7), 1091–1092.

Birn, A. E., Pillay, Y., & Holtz, T. (Eds.). (2017). *Textbook of global health* (4th ed.). Oxford, UK: Oxford University Press.

Bill & Melinda Gates Foundation (BMGF). (n.d.). Who we are, Executive Management Team. Retrieved from