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Global Health

Learning Objectives

Upon completion of this chapter, the student should be able to:

1. State the leading causes of disease and mortality in the world;
2. Identify major factors in international health patterns;
3. Name and define the major organizations involved in international health;
4. Describe international standards and objectives in health;
5. Describe international efforts in disease eradication, control, and health promotion.

INTRODUCTION

Globalization of health is the growth of international transfer of diseases and cooperation in combating societal conditions that create diseases and their effects on nations and the global community. The concern over communicable diseases goes back throughout history to epidemics and pandemics that cost countless lives. Global health includes cancers and other non-communicable diseases (NCDs) and conditions fostered by lifestyle, poor nutrition, and harmful personal habits, as well as adverse social conditions such as poverty and insecurity. International cooperation is essential to address disease threats and health conditions common to many countries in the world. Globalization of health includes the rapid movement of large numbers of people, foods, drugs, vaccines, medical education, and technology from place to place. It recognizes that health and economic development are interlinked, and that social equity in health is essential to achieve the newly reiterated goals of Health for All. In addition, many new factors including rapid mass travel, global communication, and entertainment promote broadening of the effect of communicable diseases and common risk factors leading to epidemics of chronic diseases. Transportation, colonization, and commerce have been responsible for the dissemination of disease throughout history. With rapid movement of large numbers of people by sailing ships, steamships, rail, and later air, the possibility of disease transmission by travelers has increasingly become a global public health problem.

More generally, globalization is a process of international trade liberalization, privatization, and domestic

deregulation, by which the peoples of the world are becoming part of a single society. The globalization process has intensified since the 1990s with the removal of barriers to international trade and foreign direct investments. At the same time, a combination of economic, technological, environmental, social, cultural, and political forces came into play which increased the commonality of global health concerns and promoted shared attempts to address global warming, poverty, ill-health, and inequities. Globalization has a complex influence on health, both negative and positive. The Millennium Development Goals (MDGs) constitute an attempt by the United Nations (UN) to address global inequities of poverty, maternal and child health, communicable and other diseases, environmental degradation, and other markers of an increasingly interactive world (Box 16.1).

Events in any part of the world can affect the status of health of people in other parts of the globe. There is a dynamic interaction and interdependence so that a global approach is essential to achieve health targets, even locally. Without restating arguments elaborated throughout the text, current and future generations of public health professionals must be well aware of what is occurring outside their communities and countries. This means not only learning from the news media of outbreaks of exotic diseases, but also recognizing that the political, social, and economic upheavals that define everyday existence, across the street or halfway around the world, affect us all. Even the most remote communities in the world are not immune to the global impacts of distant military coups, civil wars, natural disasters, economic crises, or epidemics. In the spring of 2013, a new avian influenza virus, H7N9, appeared in China, with 131 cases and 36 deaths to the end of May 2013. Over 75 percent of the victims probably contracted the virus from poultry or in markets selling live chickens. Some caught the virus from family members, although no one seems to have been infected by breathing the same air as an infected person (Zhu et al., 2013). A new coronavirus, Middle East respiratory syndrome coronavirus (MERS-CoV), appeared in 2013 in Saudi Arabia and other countries of the Middle East, as well as among travelers from other countries including France and the UK. MERS-CoV causes severe respiratory illness with high mortality rates and may be transmitted from person to person, with 90 cases with 50 percent case fatality reported as of June 2013. Each of these two new threats raises the possibility of a wide epidemic or pandemic. Either

BOX 16.1 Health in the Post-2015 Development Agenda: Need for a Social Determinants of Health Approach

The United Nations (UN) initiated the Millennium Development Goals approach, supported by almost all member states, which has had positive effects in mobilizing national and donor support for life-saving projects and has made real progress in achieving the set goals. Preparation for the post-2015 period will require a new commitment to reducing social inequalities in health.

The UN stresses social determinants of health based on the Constitution of the World Health Organization, which states that “health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” and that “the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition”.

The UN also emphasizes that “the health of all peoples is fundamental to the attainment of peace and security and is dependent upon the fullest co-operation of individuals and states”.

The responsibility for health lies with national governments, which requires the “provision of adequate health and social measures”.

The Universal Declaration of Human Rights states that “everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control.

Health and social security are thus recognized as human rights. These include special care and social protection for children, compulsory elementary education for children, and care and protection of the rights of mentally ill and handicapped people.

Source: United Nations. Health in the post-2015 development agenda: need for social determinants of health approach Joint statement of the UN Platform on Social Determinants of Health. Available at: http://www.who.int/social_determinants/advocacy/UN_Platform_FINAL.pdf [Accessed 29 May 2013].

or both of these could become a new pandemic on the scale of the severe acute respiratory syndrome (SARS) in 2003, or may fade from concern. The lessons learned from SARS may have made global public health more alert and prepared to address new pandemic threats, but huge risks still prevail despite its legacy (Braden et al., 2013). Only by careful professional monitoring and international cooperation will we know of or be able to face the challenge if one or both of H7N9 or MERS-CoV becomes a pandemic.

The world is, and has long been, global in political, economic, and health terms. Yet now there are methods of identifying and controlling potential and actual threats, even though inequities in health are still blatant and call for mutual

help as well as self-help. This inequality is not only between countries, but within even developed and much more so in the rapidly developing countries, with middle and upper classes living with luxuries and a comfortable lifestyle. Globalization has a complex influence on health. Some components of globalization such as trade liberalization and technology transfer could increase efficiency, welfare, and health. However, under the existing barriers to the international markets, the weaker countries need help to address the stagnation preventing them from improving their market position, thereby increasing wealth and health of the population. Financial aid alone can have destructive effects by creation of dependency and misuse of resources through corruption and promotion of military primacy use of funds, while fundamental poverty and health issues are not a high priority on national agendas.

The tools to prevent and control disease are available and widely successful, yet not well applied in many countries. In the health sector, there are inappropriate balances of health resource allocation so that important and effective preventive measures are underfunded and often left to international donors to provide. The common interest and social solidarity represented by international health efforts have achieved much but international public health efforts are necessary to combat disease and create a healthy world. Such achievements are shown in global initiatives to eradicate smallpox and great progress in reducing poliomyelitis (polio) from 125 countries to only three endemic countries in 2013, although spread to other countries is still being seen. Global polio surveillance data from 28 May 2013 report 41 polio cases from the three remaining endemic countries: Afghanistan, Nigeria, and Pakistan. In 2012, a total of 223 polio cases was reported from five countries: Afghanistan, Chad, Niger, Nigeria, and Pakistan. Of the 2012 polio cases, 97 percent (217 of the 223 cases) were reported from the three remaining endemic countries (CDC, 2013).

Previous generations of public health advocates have made tremendous contributions to understanding disease, how it spreads, and how it affects all forms of life. But mistakes have been made; human immunodeficiency virus (HIV) infection was not detected early enough, or its impact realized, until it had already reached pandemic proportions. In the twenty-first century, public health is globalized as the health of all humans is globally linked. Yesterday’s local SARS, Ebola, measles, or cholera outbreak 10,000 miles away may manifest itself today in the arrival hall of your local airport. With this very real possibility in mind, the future of public health will require advocacy of international economic, political, and social justice policies, with the necessity for organized common efforts to improve health around the world.

NCDs have also been transferred to new populations with economic development and gross inequality by the adoption of lifestyle risk factors, such as smoking, automobiles, and western diets heavy in fats, bringing rising

waves of mortality from these causes to areas with previously low rates. The impacts of economic, demographic, and epidemiological changes are not uniform, either within or between countries. Domestically and internationally, poor health and poverty affect the stability of us all. A popular late twentieth-century slogan, “think globally, act locally”, expresses the interdependent realities of public health.

Another aspect of globalization of health is the increased mobility of health professionals, health consumers, and international organizations working or seeking help across boundaries. The resulting massive flow of trained health workers from developing to developed nations makes building the human resource infrastructure a serious problem. This aspect of globalization of professional training and mobility threatens poor countries with the loss of skilled professionals they so badly need to build their health infrastructure capacity. The development of bachelor’s level training for public health managers and of training different levels of mid-level providers and community health workers (CHWs) becomes a necessary and increasingly implemented approach.

Previous chapters addressed demographic and epidemiological issues with examples from different countries, as well as regional and global trends. In this chapter, major trends and contemporary patterns of health and disease in the world are presented, along with policy issues for improving those patterns. Global trends can be analyzed by grouping countries by geographic region, by levels of economic development, and by political, cultural, or ethnic characteristics. Global health requires both official and unofficial international health organizations to stimulate and facilitate joint efforts to achieve common goals, such as preventing the transmission of communicable disease or, more generally, promoting *Health for All*.

THE GLOBAL HEALTH SITUATION

Global health status involves a wide diversity of social and economic standards, disease, disability, and mortality throughout the world. Environmental and socioeconomic factors and health interventions all play a role in health status. Differences between and among developed and developing countries in these factors are great, yet there are common concerns and shared interests in health development. Studies of countries classified by geographic region, such as the World Health Organization (WHO) regions, or by economic status, such as the Organisation for Economic Co-operation and Development (OECD) countries, European Union (EU), Central and Eastern Europe (CEE), and the former Soviet Union (Commonwealth of Independent States or CIS), help to provide an overall picture of demographic transitions and epidemiological shifts. Economic groupings of countries are usually measured by gross domestic product (GDP) per capita, a measure of national productivity, which in industrialized countries is more than 20 times greater than that of the developing countries.

Globally, average life expectancy at birth has increased by about 24 years, from 46.5 years in 1950–1955 to 64 years in 1990 and to 70 years in 2011 (WHO, 2013). The gain in African life expectancy from 1990 to 2011 is estimated to be 6 years (from 50 to 56), some 14 years lower than the global rate and 20 years below life expectancy in the Americas and European Region. For the Americas, the gain from 1990 to 2011 was 5 years (from 71 to 76); for the European Region 4 years (from 72 to 76); South-East Asia 8 years (from 59 to 67); and the Western Pacific 6 years (from 70 to 76) (Table 16.1). Life expectancy at age 60 shows much smaller differences between the regions and slower rates of improvement.

Table 16.2 shows health status indicators by levels of development of countries. From 1990 to 2009, life

TABLE 16.1 Life Expectancy at Birth and 60 Years by World Health Organization Region, 1990, 2000, and 2011

Region	Life expectancy at age 0 (years)			Life expectancy at age 60 (years)		
	1990	2000	2011	1990	2000	2011
Africa	50	50	56	15	15	16
Americas	71	74	76	20	21	22
South-East Asia	59	63	67	15	17	17
Europe	72	73	70	19	20	21
Eastern Mediterranean	61	65	68	17	18	18
Western Pacific	70	72	76	18	19	21
Global	64	66	70	18	19	20

Source: World Health Organization. Life expectancy by WHO region, 1990, 2000, 2011. Available at: <http://apps.who.int/gho/data/view.main.690?lang=en> [Accessed 29 May 2013].

TABLE 16.2 Health Status Indicators by Country Income Group, Selected Years, 1990–2009

	Low Income	Lower Middle Income	Upper Middle Income	High Income
GNI per capita 2009 (PPP, US\$)	\$1,457	4,696	12,447	36,708
Life expectancy at birth (years)				
1990	52	63	68	76
2009	57	68	71	80
Adolescent fertility rate (per 1000 girls aged 15–19 years), 2000–2008				
	115	37	53	21
Total fertility rate (per 1000 adult women)				
1990	5.4	3.4	2.8	1.8
2009	3.9	2.5	2.0	1.7
Adult literacy rate (%)				
1990–1999	40	63	87	NA
2000–2008	63	80	92	NA
Births attended by trained attendant 2000–2010 (%)				
	40	64	96	100
Maternal mortality ratio (confidence interval)				
1990	850 (590–1300)	400 (290–590)	120 (95–160)	15 (14–19)
2008	580 (420–840)	230 (170–330)	82 (66–110)	15 (14–18)
Infant mortality rate (per 1000 live births)				
1990	108	64	40	10
2009	75	42	19	6
Under-5 mortality rate (per 1000 live births)				
1990	170	90	50	12
2009	117	57	22	7
Low birth weight, 2000–2009 (%)				
	15	17	8	7
Immunization (%)				
Measles				
1990	57	73	78	84
2009	78	79	93	93
DPT3				
1990	58	78	74	88
2009	80	79	93	95

Note: GNI=gross national income; PPP=purchasing power parity; DPT3=diphtheria, pertussis, tetanus vaccine, three doses.

Source: World Health Organization. World health statistics. 2011. Geneva: WHO. Available at: http://www.who.int/whosis/whostat/EN_WHS2011_Full.pdf [Accessed 12 June 2013].

expectancy at birth for boys and girls gained 5 years in both the low-income developing and middle-income countries gained 5 years' life expectancy (from 52 to 57 and from 63 to 68, respectively), upper middle-income countries gained 3 years (from 68 to 71), and high-income countries gained 4 years (from 76 to 80). Between socioeconomic regions, life expectancy varies more widely. In 2011, life expectancy at birth ranged from 55 years in sub-Saharan Africa to over 80 years in industrialized countries. In the European Region,

average life expectancy for men varies widely from west to east; for men in the Commonwealth of Independent States (CIS) it is 65 years compared with 79 years in Western Europe. Most of the excess mortality in the CIS was due to cardiovascular disease (CVD) related to high rates of coronary heart disease, strokes, binge drinking, diet, and smoking, and a further 20 percent due to trauma (see Chapter 13).

The differences are due to many factors, including quality of water supply and sanitation, housing, education,

nutrition, lifestyle, family planning measures, and effective public health measures such as immunizations against infectious diseases and access to health services. Life expectancy has increased in the developed world but also in the low-mortality developing countries. Countries such as China and India have shown great improvements in under-fives' mortality in the past 50 years, in contrast to most African countries. The under-five child mortality rate in India declined from 118 in 1990 to 66 per 1000 population in 2009; in China during the same period the mortality rate for this group declined from 46 to 19 (UNICEF, 2010).

Countries now considered developed had in the past disease patterns similar to developing countries today. It should be noted that infant and maternal mortality rates in many developing countries today are similar to those in the USA in the 1920s (Table 16.2). Furthermore, within industrialized countries, there are social, ethnic, or immigrant groups whose current health status is characteristic of developing countries. In many developing countries, the rising middle-class populations show epidemiological patterns similar to those in developed countries, such as rising rates of heart disease.

The enormous differences in GDP per capita and in fertility rates are reflected by differences in almost all health status indicators. Population growth in the developing countries, due to high fertility rates and declining child mortality, is a key factor in poverty and poor health status, and thus is a major health problem.

Trends in demographic and health indicators for countries classified as high income, upper middle income, and lower middle income all show positive changes in health status: fertility rates have declined in developing countries, but also more recently in the low-income countries. Adult literacy rates are increasing in the low-income and lower-middle-income countries. Immunization coverage has improved globally, as have infant, child, and crude mortality rates, so that life expectancy is generally rising. However, there remains a large discrepancy between rich and poor in health status indicators; in the low-income countries, reported maternal mortality in 2008 was more than 38 times higher, and infant mortality in 2009 was more than 12 times that of the high-income countries.

Despite the fact that health status indicators have improved for the least developed countries, on the basis of current trends, the UN Population Division estimates that the world infant mortality rate was 53.9 in 2000–2005 and projects that it will decline to 45.1 by 2015 and to 23.4 per 1000 population by 2030. Globally, child mortality rates have declined by almost half between 1990 and 2011. In 1990, some 12 million children under the age of 5 died, while in 2010, there were 7.6 million deaths in under-fives (Figure 16.1). In 2011, the number of these deaths declined to 6.9 million, still mostly in developing countries and largely from preventable or easily treatable diseases. Recent data show that some progress has been made in reducing maternal,

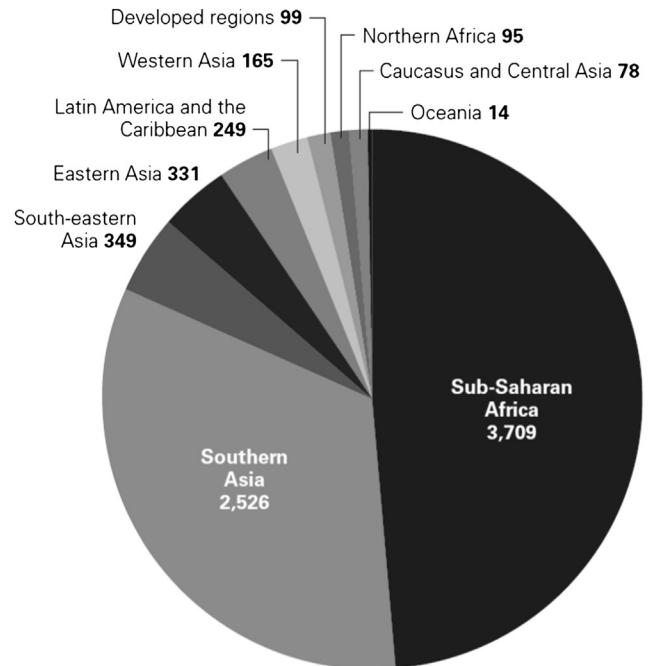


FIGURE 16.1 Distribution of global mortality (thousands) for children, 2010. Source: United Nations Children's Fund. *Levels and trends in child mortality report 2012*. New York: UNICEF; 2012. Available at: http://apromiserenewed.org/files/UNICEF_2012_child_mortality_for_web_0904.pdf [Accessed 30 May 2013].

newborn, and under-five mortality, but not swiftly enough to reach the targets by 2015. Of the eight goals, MDG4 (child mortality) and MDG5 (maternal mortality) are the farthest from being achieved by 2015. Failure to halve child mortality by 2015 would mean that “5 million would die, still largely from preventable diseases” (UNICEF, 2012).

While the gap between developed and developing countries in health remains very wide, the adaptation and dissemination of health technology are having profound effects in raising standards in the latter. Each can learn, for good or ill, from the other. A developing country may spend most of its health resources in central teaching hospitals, while primary care is neglected. Adoption of appropriate priorities, including adoption of available vaccines and other health technologies, can bring dramatic improvements in health in developing countries. Conversely, innovations in the health field from developing countries can also be applied in developed countries. For example, oral rehydration therapy (ORT) and CHWs, providing care in developing country conditions, can be applied to unmet needs in industrialized countries.

PRIORITIES IN GLOBAL HEALTH

Poverty and disease are interactive. Sick people have reduced or no capacity to perform well economically. Health is not only a development goal, but also a means to promote

development. The eight MDGs agreed upon by all the countries of the world target poverty all over the world with a community-based bottom-up approach as well as national targeted programs which must be integrated at the community level (Table 16.3). Three of the eight MDGs directly address health, and all the others are intricately linked to health. Many other global issues in health include climate change, bioterrorism, global epidemiological surveillance, drug-resistant organisms for tuberculosis (TB), malaria and other infectious diseases, aging, obesity and diabetes, alcohol and drug abuse, violence, prostitution, and human trafficking. Achievements were unequally distributed across and within regions and countries. Moreover, progress has slowed for some MDGs after the multiple crises of 2008–2009. Inadequate levels of health spending by the world's poorest countries are the major factor in continuance of the vicious cycle of poverty and illness.

The MDGs represent an effort by the international community at the highest political level to address the various pressing issues in the world as a global village in which

problems of one country cannot be seen in isolation. With 2015 approaching, an MDG monitoring system has been established to help track the progress of individual countries, to learn about new challenges, and to support organizations worldwide working on the MDGs. The first MDG has two targets: to reduce by half, between 1990 and 2015, the proportion of people whose income is less than US\$1 a day; and to halve, between 1990 and 2015, the proportion of people who suffer from hunger (Table 16.3).

The WHO's World Health Reports of 2006 and 2007 addressed human resources for health and global health security as their main topics. The deficiency in the trained health workforce in developing countries and the movement of health workers from poor to richer nations are matters of global concern. The revised International Health Regulations (IHR) present a new code for public health based on long traditions derived from the plague and quarantine, cholera and sanitation, and smallpox and immunization. They include issues related to preparedness for chemical and bioterrorist emergencies, and attempts to provide a basis for localization

TABLE 16.3 Millennium Development Goals from 1990 to 2015

1. Eradicate extreme poverty and hunger	Reduce by half the proportion of people with income less than one dollar a day Achieve full and productive employment, decent work for all; including women and young people Halve the proportion of people who suffer from hunger
2. Achieve universal primary education	Ensure by 2015 that children everywhere, boys and girls alike, be able to complete primary schooling
3. Promote gender equality and empower women	Eliminate gender disparity in primary and secondary education, preferably by 2005, and in all levels of education no later than 2015
4. Reduce child mortality	Reduce by two-thirds, between 1990 and 2015, the under-five child mortality rate
5. Improve maternal health	Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio Achieve, by 2015, universal access to reproductive health
6. Combat HIV/AIDS, malaria, and other diseases	Have halted by 2015 and begun to reverse the spread of HIV/AIDS Achieve, by 2010, universal access to treatment for HIV/AIDS for all in need Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases
7. Ensure environmental sustainability	Integrate principles of sustainable development into country policies and programs and reverse the loss of environmental resources Reduce biodiversity loss, by 2010, a significant reduction in the rate of loss of land area covered by forest; CO ₂ emissions, total, per capita; consumption of ozone-depleting substances; proportion of fish stocks within safe biological limits; proportion of total water resources used; proportion of terrestrial and marine areas protected; proportion of species threatened with extinction Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation Proportion of population using an improved drinking water source Proportion of population using an improved sanitation facility By 2020, to achieve significant improvement in the lives of at least 100 million slum dwellers
8. Develop a global partnership for development	In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries In cooperation with the private sector, make available the benefits of new technologies, especially information and communications

Note: HIV/AIDS=human immunodeficiency virus; AIDS=acquired immunodeficiency virus; CO₂=carbon dioxide.

Sources: United Nations, 2005. Available at: <http://www.un.org/millenniumgoals/> and <http://mdgs.un.org/unsd/mdg/Resources/Attach/Indicators/OfficialList2008.pdf> [Accessed 30 April 2013].

United Nations. MDG indicators: all indicators should be disaggregated by sex and urban/rural as far as possible. Effective 15 January 2008. Available at: <http://mdgs.un.org/unsd/mdg/host.aspx?Content=indicators/officiallist.htm> [Accessed 11 June 2013].

and control of potentially highly dangerous infectious diseases, to prevent them spreading uncontrollably.

Poverty–Illness–Population–Environment

The process and outcome evaluation method is being used to track the work done in this regard by the World Bank, the United Nations Children’s Fund (UNICEF), the WHO, and the UN Food and Agriculture Organization (FAO), using indicators such as underweight children under the age of 5 years and the proportion of the population with an income below US\$1 per day. Progress is variable across regions and within countries. The global economic crisis since 2008 has been a factor in slower progress for some targets.

The decade 2000–2010 has seen a substantial decline in poverty all over the world, largely because of the economic growth in China, India, Indonesia, Brazil, Russia, and other mid-level income countries, leading to a spurt in the GDP of the countries in Asia, especially in the Indian subcontinent and South-East Asia, and in sub-Saharan Africa. The situation in Brazil, Russia, India, and China (BRIC countries),

South Africa and sub-Saharan Africa has improved, with many countries experiencing high rates of economic growth.

Globally, the number of people living in conditions of extreme poverty, defined as living on less than US\$1.25 per person per day, has fallen by 700 million from 1990 to 2010. The first MDG target, of reducing extreme poverty by half (MDG1), has been met well before 2015, but 1.2 billion are still living in extreme poverty. Globally, 384 million workers lived below the \$1.25 a day poverty line in 2011, a reduction of 294 million since 2001. Some 870 million people are estimated to be undernourished, including more than 100 million children under the age of 5.

Major economic growth patterns in China and India in recent decades, and more recently in Africa, have created strong middle classes, but rural and urban poverty remains high (UN Goal 1, Eradicate extreme poverty and hunger, 2013). The third target (MDG3), devoted to equality, has been achieved. For MDG2, increased enrollment of boys and girls in primary school has reached 90 percent in developing countries, so this target is also being reached. [Box 16.2](#) indicates

BOX 16.2 The World Health Organization (WHO) Agenda, 2013

1. *Promoting development* – During the past decade, health has been recognized as a key driver of socioeconomic progress, and more resources than ever are being invested in health. Yet poverty continues to contribute to poor health, and poor health keeps large populations in poverty. Health development is directed by the ethical principle of equity: access to life-saving or health-promoting interventions should not be denied for economic or social reasons. Activities are aimed at health development with priority to health outcomes in poor and disadvantaged countries or vulnerable groups. The Millennium Development Goals addressing poverty reduction and other programs preventing and treating chronic diseases, and the neglected tropical diseases are cornerstones of the health and development agenda.
2. *Fostering health security* – Great threats to international health security arise from outbreaks of emerging and epidemic-prone diseases. These are occurring in increasing numbers, fueled by rapid transportation, urbanization, environmental mismanagement, the way food is produced and traded, and the way antibiotics are used and misused. Shared vulnerability to health security threats demands joint action to collectively defend against outbreaks. Collective security is crucial to identify and control potential pandemics. This was strengthened by newly revised International Health Regulations (2007), and absorption of lessons learned from the HIV, SARS, and subsequent pandemics.
3. *Strengthening health systems* – For health improvement to help reduce poverty, health services must reach poor and underserved populations, especially those in neglected rural and urban slums. Health systems in many parts of the world are unable to do this, so strengthening of health systems is a high priority. This includes addressing the provision of adequate numbers of appropriately trained staff, sufficient financing, suitable systems for collecting vital statistics, with access to appropriate technology and essential drugs, with priority on local primary care.
4. *Harnessing research, information, and evidence* – Evidence and awareness of “best practices” provides the foundation for setting priorities, policies, defining strategies, and measuring results. WHO generates authoritative health information, in consultation with leading experts, to set norms and standards, articulate evidence-based policy options, and monitor the evolving global health situation.
5. *Enhancing partnerships* – WHO works with the support and collaboration of many partners, including UN agencies and other international organizations, donors, civil society and the private sectors. The role of donors in advancing health in developing countries must encourage national governments to increase their allocation and commitment to health as a priority. WHO uses the strategic power of evidence to encourage partners implementing programs within countries to align their activities with best technical guidelines and practices, as well as with the priorities established by member countries.
6. *Improving performance* – WHO participates in reforms to improve its efficiency and effectiveness, both at the international level and within countries. WHO aims to enhance its work in a motivating and rewarding environment at country, regional and global levels.

Note: HIV = human immunodeficiency virus; SARS = severe acute respiratory syndrome; UN = United Nations.

Source: Adapted from World Health Organization. *The WHO agenda*. Geneva: WHO; 2013. Available at: <http://www.who.int/about/agenda/en/index.html> [Accessed 30 April 2013].

current WHO thinking on the agenda for the post-MDG period, i.e., after 2015.

The seventh MDG has three targets which deal with sustainable environment, sanitation, and housing (for at least 100 million slum dwellers). This is a crucial goal as the great economic growth of many countries will be halted because of environmental degradation. Table 16.4 shows important indicators from developing countries on their track to achieve the MDGs.

The interactions among poverty, population growth, and environmental degradation combine to adversely affect many developing countries and hundreds of millions of people globally. In many developing countries, economic stagnation and political instability compound these issues, causing an inability to address basic human needs and condemning more generations to ill-health and early death. Although the effects of low income, lack of basic sanitation, and crowding in rural poverty or the slums of megacities cannot be overcome by health measures alone,

the potential for raising the quality of life and survival rates by public health measures is very great. The leading causes of disease and mortality among adults are shown in Tables 16.5–16.7. These tables indicate the leading causes of death globally are ischemic heart disease, stroke and respiratory diseases. There is a commonality between low and medium income countries with upper income countries so that cost-effective preventive measures are needed for NCDs for countries at all economic levels. Medium and even low income countries need to prioritize prevention for NCDs as much as for HIV, vaccine preventable diseases and maternal-child health and nutrition issues.

Industrialized countries have made great progress in reducing mortality from infectious diseases as well as NCDs, but there is still a long way to go in coping with very substantial pockets of poverty, homelessness, violence, preventable disease, environmental degradation, and limited access to health care. The southern hemisphere is largely made up of developing countries with massive economic

TABLE 16.4 Global Progress in Reducing Child Mortality Rate: Average Annual Rate of Reduction in Under-Five Mortality Rate (Deaths per 1000 Live Births) for 1990–2011, and Percentage Decline During 1990–2011

Region	Under-5 Mortality Rate		MDG Target	Decline, 1990–2011 (%)	Average annual rate of reduction, 1990–2011 (%)	Progress Towards MDG Target 2011
	1990	2011				
Developed regions	15	7	5	55	3.8	On track
Developing regions	97	57	32	41	2.5	Insufficient progress
North Africa	77	25	26	68	5.5	On track
Sub-Saharan Africa	178	109	59	39	2.3	Insufficient progress
Latin America and Caribbean	53	19	18	64	4.8	On track
Caucasus and Central Asia	76	42	25	44	2.8	Insufficient progress
East Asia	48	15	16	70	5.7	On track
Excluding China	28	17	9	38	2.3	On track
South Asia	116	61	39	47	3.1	Insufficient progress
Excluding India	119	60	40	50	3.3	Insufficient progress
South-East Asia	69	29	23	58	4.1	On track
West Asia	63	30	21	52	3.5	On track
Oceania	74	50	25	33	1.9	Insufficient progress
World	87	51	29	41	2.5	Insufficient progress

Note: The table shows progress towards Millennium Development Goal 4 (MDG4), with countries classified according to the following thresholds. On track=under-five mortality was <40 deaths per 1000 live births in 2011 or that the annual rate of reduction was at ≥4% over 1990–2011; insufficient progress=under-five mortality was ≥40 deaths per 1000 live births in 2011 and that the annual rate of reduction was ≥1% but <4% over 1990–2011.

All calculations are based on unrounded numbers. These standards may differ from those in other publications by Inter-agency Group for Child Mortality Estimation members.

Source: United Nations Children's Fund. Levels and trends in child mortality report 2012. Estimates developed by the UN Inter-agency Group for Child Mortality Estimation. New York: UNICEF; 2012. Available at: http://apromiserenewed.org/files/UNICEF_2012_child_mortality_for_web_0904.pdf [Accessed 30 May 2013].

and social needs. The north–south socioeconomic divide is one that will shape global health and politics in the twenty-first century. [Table 16.6](#) shows the prevalence of risk factors for causes of death in countries grouped by income levels. [Table 16.7](#) indicates the disability-adjusted life years (DALYs) lost by disease risk factors which shows the effects on younger ages in the population (see Chapters 3 and 11).

During the 1990s, a number of developing countries entered a phase of rapid economic and industrial growth, combining the advantages of educated low-wage workforces with market economies. Some Asian countries moved ahead rapidly with economic development, creating strong rates of growth. The breakdown of traditional social patterns, traditional rural ways of life, and intergenerational family structure to attain better education, upward mobility, and small family units in South-East Asian economies will compound these problems.

The recognition that poverty and ill-health are interactive led the industrialized nations (G7 plus Russia) to take an important step in mid-1999 to relieve debt and provide aid-related loans to very poor countries by some US\$118 billion. This helped many countries in sub-Saharan Africa by reducing their debt repayment by one-third to one-half. Despite this important step, most poor countries pay more on servicing debts than they do on health and education for their people.

Child Health

Almost 19 percent of total deaths in the world (10.5 million) are of children under 5 years of age and almost 98

percent are in the developing world. The figures seem to have improved in many countries since 1970 when the figure was 17 million, but in 14 African countries the present levels of under-five mortality are higher than they were in 1990. About 35 percent of Africa’s children are at a higher risk of death than they were 10 years ago. Nineteen African countries are in the list of the top 20 countries in the world with the highest rates of under-five mortality. A baby born in an African country, for example, in Sierra Leone, is three and a half times more likely to die before its fifth birthday than a child born in India, and more than 100 times more likely to die than a child from a developed European country or even Singapore (WHO, 2003). The leading causes of under-five mortality in the poor countries are perinatal conditions, lower respiratory tract infections, diarrheal diseases, and malaria. Sub-Saharan Africa has undergone a severe onslaught by the HIV epidemic, wiping out an estimated 332,000 children in 2002 (WHO, 2003). There is a growing health inequality in children’s health all over the world, with a higher rate of death if they are poor and undernourished. [Table 16.8](#) shows progress made in MDG indicator 4 (child mortality) for 1990 and 2010, along with infant mortality by UNICEF regions.

Most deaths in children under the age of 5 are preventable, as can be seen from the list given in [Table 16.9](#). The 10 leading causes listed in the table constitute 86 percent of all causes of under-five mortality. Five diseases – pneumonia, diarrhea, malaria, measles, and acquired immunodeficiency syndrome (AIDS) – account

TABLE 16.5 Ten Leading Causes of Mortality Worldwide, 2008

Cause	Deaths (thousands)	% of Deaths
Ischemic heart disease	7,250	12.8
Stroke and other cerebrovascular disease	6,150	10.8
Lower respiratory infection	3,460	6.1
Chronic obstructive pulmonary disease	3,280	5.8
Diarrheal disease	2,460	4.3
HIV/AIDS	1,780	3.1
Trachea, bronchus, and lung cancers	1,390	2.4
Tuberculosis	1,340	2.4
Diabetes mellitus	1,260	2.2
Road traffic accidents	1,210	2.1
Subtotal	29,580	52.0
Total estimated global deaths	57,000	100.0

Note: Total deaths globally estimated as 57 million, 2008.

HIV/AIDS=human immunodeficiency virus; AIDS=acquired immunodeficiency virus.

Source: World Health Organization. Top ten causes of death. Fact sheet no. 310 [updated June 2011]. Available at: <http://www.who.int/mediacentre/factsheets/fs310/en/> [Accessed 30 May 2013].

TABLE 16.6 The 10 Leading Causes of Death by Income Group, 2011

Country Income Groupings	Leading Causes of Death	Deaths per 1,000 Population	Amenable to Preventive Care
High income countries	Ischemic heart disease	119	+++
	Stroke	69	++++
	Lung, trachea, bronchus cancer	51	++++
	Alzheimers disease, other dementias	48	+
	COPD	32	++
	Lower respiratory infections	32	+++
	Colorectal cancers	27	+++
	Diabetes mellitus	21	++
	Hypertensive heart disease	20	+++
	Breast cancer	18	+++
Upper middle income countries	Stroke	126	++++
	Ischemic heart disease	120	+++
	COPD	45	++
	Lung trachea, bronchus cancer	28	++++
	Lower respiratory infections	22	+++
	Road injury	21	+++
	Diabetes mellitus	20	++
	Liver cancer	19	++
	Hypertensive heart disease	18	+++
	Stomach cancer	18	+++
Lower middle income countries	Ischemic heart disease	93	+++
	Stroke	75	++++
	Lower respiratory infections	60	+++
	COPD	51	+++
	Diarrheal diseases	47	+++
	Prematurity	27	+++
	HIV/AIDS	24	++
	Tuberculosis	22	++
	Diabetes mellitus	20	++
	Road injury	19	+++
Low income countries	Lower respiratory infections	98	+++
	HIV/AIDS	70	++
	Diarrheal diseases	69	+++
	Stroke	56	+++
	Ischemic heart disease	47	+++
	Prematurity	43	++
	Malaria	38	++
	Tuberculosis	32	++
	Protein energy malnutrition	32	++++
	Birth asphyxia and birth trauma	30	++

Note: WHO Member States are classified according to the World Bank income categories for the year 2011 (World Bank list of economies, July 2012). Estimate of “amenable to preventive care” by text authors.

Source: Adapted from World Health Organization. The top 10 causes of death. Available at: <http://www.who.int/mediacentre/factsheets/fs310/en/> (accessed 14.1.14.)

for about half of under-five deaths. Most of these lives can be saved by expanding coverage of existing interventions, especially among poor families using a bottom-up approach. Many vaccine-preventable diseases are listed in the top causes, and it has been seen, as with polio, that a concerted effort by health authorities in promoting immunization can dramatically reduce child mortality. With simple methods like ORT, mortality related to diarrhea can be reduced within a short time. This calls

for a range of health interventions, including greater emphasis on:

- contraceptive care – acceptability, availability, costs and use
- antenatal care – accessibility and quality
- skilled attendants at delivery – accessibility, hygiene and quality; vitamin K injection and antibiotics for newborns

TABLE 16.7 Ranking of Selected Risk Factors: 10 Leading Risk Factor Causes of Disability-Adjusted Life Years (DALYs) by Income Group, 2004

Rank	Risk Factor	DALYs (millions)	% of Total
(a) World			
1	Childhood underweight	91	5.9
2	Unsafe sex	70	4.6
3	Alcohol use	69	4.5
4	Unsafe water, sanitation, hygiene	64	4.2
5	High blood pressure	57	3.7
6	Tobacco use	57	3.7
7	Suboptimal breastfeeding	44	2.9
8	High blood glucose	41	2.7
9	Indoor smoke from solid fuels	41	2.7
10	Overweight and obesity	36	2.3
(b) Low-income countries			
1	Childhood underweight	82	9.9
2	Unsafe water, sanitation, hygiene	53	6.3
3	Unsafe sex	52	6.2
4	Suboptimal breastfeeding	34	4.1
5	Indoor smoke from solid fuels	33	4.0
6	Vitamin A deficiency	20	2.4
7	High blood pressure	18	2.2
8	Alcohol use	18	2.1
9	High blood glucose	16	1.9
10	Zinc deficiency	14	1.7
(c) Middle-income countries			
1	Alcohol use	44	7.6
2	High blood pressure	31	5.4
3	Tobacco use	31	5.4
4	Overweight and obesity	21	3.6
5	High blood glucose	20	3.4
6	Unsafe sex	17	3.0
7	Physical inactivity	16	2.7
8	High cholesterol	14	2.5
9	Occupational risks	14	2.3
10	Unsafe water, sanitation, hygiene	11	2.0
(d) High-income countries			
1	Tobacco use	13	10.7
2	Alcohol use	8	6.7
3	Overweight and obesity	8	6.5
4	High blood pressure	7	6.1
5	High blood glucose	6	4.9
6	Physical inactivity	5	4.1
7	High cholesterol	4	3.4
8	Illicit drugs	3	2.1
9	Occupational risks	2	1.5
10	Low fruit and vegetable intake	2	1.3

Note: *Countries grouped by gross national income per capita: low income=US\$825 or less; high income=US\$10,066 or more.

Source: Adapted from World Health Organization. 2009. Global health risks: mortality and burden of disease attributable to selected major risks. Geneva: WHO; 2009. Available at: http://www.who.int/healthinfo/global_burden_disease/GlobalHealthRisks_report_full.pdf [Accessed 28 May 2013].

TABLE 16.8 Infant and Child Mortality Rate, 1990–2010

	Infant Mortality		Child Mortality	
	1990	2010	1990	2010
World	61	40	88	57
Least developed countries	106	71	170	110
Developing countries	67	44	97	63
Industrialized countries	9	5	10	6
Sub-Saharan Africa	105	76	174	121
Latin America and the Caribbean	43	18	54	23
East Asia and Pacific	41	19	55	24
South Asia	86	52	120	67
CEE/CIS	41	19	50	23

Note: Deaths of children before reaching the age of 1 year, per 1000 live births.

CEE= Countries of Eastern Europe; CIS=Commonwealth of Independent States (Russia, Ukraine, Bylorussia, etc.); NA= not available.

Sources: United Nations Children's Fund. State of the world's children 2012.

Table 1: Basic indicators. Available at: http://www.unicef.org/sowc/files/SOWC_2012-Main_Report_EN_21Dec2011.pdf [Accessed 6 June 2013].

- postnatal care for infant and mother – promoting breast-feeding, hygiene, immunization, bed-net use, and follow-up
- child health – nutrition, vitamin and mineral supplements, immunization, growth and development monitoring
- financial investments in maternal, newborn and child health with priority in planning
- equity of access, health systems, and policy in universal health care development (WHO, 2010).

Between 2000 and 2010, the global burden of deaths in children younger than 5 years decreased by 2 million, of which pneumonia, measles, and diarrhea contributed the most to the overall reduction (0.451 million, 0.363 million, and 0.359 million, respectively). However, only tetanus, measles, AIDS, and malaria (in Africa) decreased at an annual rate sufficient to attain MDG4 (Liu et al., 2012). Table 16.9 shows the leading causes of death of infants and children up to the age of 5 globally, with 40 percent being in the first month of life (neonatal). But progress is being made with deaths due to vaccine-preventable diseases (diphtheria, measles, neonatal tetanus, pertussis and poliomyelitis) estimated to have fallen from 0.9 million in 2000 to 0.4 million in 2010 (GAVI 2012).

MDG4 is to reduce the under-five mortality rate by two-thirds between 1990 and 2015. Although child mortality has fallen by more than one-third progress is still too slow to reach the target (Figure 16.2). The most recent 2012 Millennium Goals Report reveals rural–urban inequities, with children in rural areas at a greater disadvantage for higher mortality.

TABLE 16.9 Global Causes of Death Among Children Under 5 Years, 2011

Cause of Death	% of Under-5 Deaths
Pneumonia	18
Preterm birth complications	14
Diarrhea	11
Birth asphyxia	9
Malaria	7
Other causes	41
Under-5 deaths, total causes	6.9 million

Note: More than 40% of child deaths occur during the neonatal period. Other causes include congenital anomalies, pertussis, tetanus, HIV/AIDS, and malnutrition.

Source: World Health Organization. Children: reducing mortality. Fact sheet no. 178. September 2012. Available at: <http://www.who.int/mediacentre/factsheets/fs178/en/> [Accessed 1 June 2013].

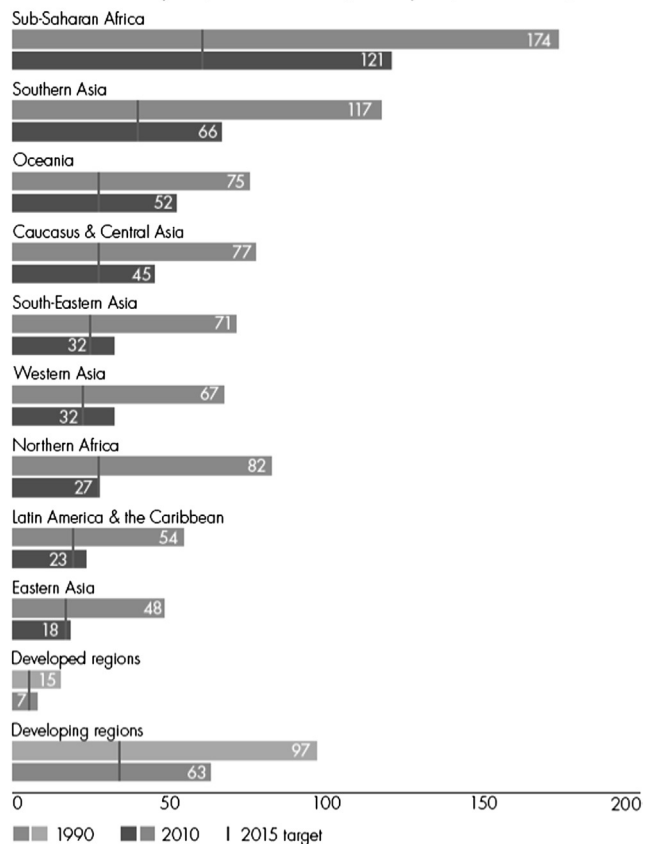
Under-five mortality rate, 1990 and 2010 (Deaths per 1,000 live births)

FIGURE 16.2 Progress in achieving reduction in child mortality in World Health Organization regions, 1990–2011. Source: United Nations. Millennium Development Goals Report 2012. Goal 4: Reduce child mortality. Available at: <http://www.un.org/millenniumgoals/pdf/MDG%20Report%202012.pdf> [Accessed 2 June 2013].

Maternal Health

The fifth target (MDG5), as seen in the previous section, is to reduce the maternal mortality ratio by three-quarters between 1990 and 2015. In developing countries, complications in the antepartum, intrapartum, and postpartum periods are leading causes of death among women. Every year, approximately 9 million women suffer some form of injury from pregnancy or childbirth which has lasting effects on their health. Africa and Asia have the majority of pregnancy-related deaths, accounting for 95 percent of the total maternal deaths in the world.

Globally, an estimated 287,000 women died during pregnancy and childbirth in 2010, a decline of 47 percent from levels in 1990. The main cause is poor access to skilled routine and emergency care. However, there is progress as some countries are on track to meet the MDG5 target of reducing maternal mortality by three-quarters by 2015. The global maternal mortality ratio in 2008 was 260 per 100,000 live births. There was wide variation among WHO regions and by level of GDP per capita country grouping. Maternal mortality ratios for the regions were: Africa 620, South-East Asia 240, Eastern Mediterranean 320, Western Pacific 51, and the Americas 66 per 100,000 live births. Rates among the countries by level of income were: low income 580 per 100,000, lower mid-level income 230, upper mid-level income 82, and high level of income 15 per 100,000 (WHO Statistical Information System, 2008). In 2005, 358,000 women

died of maternal causes, compared to 546,000 in 1990. Ninety-nine percent of these deaths occurred in developing countries. Maternal mortality was estimated as 287,000 maternal deaths in 2010 worldwide, a decline of 47 percent from 1990, but the levels in many countries were still far above the 2015 target. In the European Region progress has been seen in all sectors: EU members before 2004, new EU members, CIS countries, and Central Asian Republics (Figure 16.3).

Institutionalized delivery or the presence of a skilled attendant decreases the risk of maternal deaths to a great extent. The number of deliveries with a skilled attendant increased significantly between 1990 and 2003, from 41 to 57 percent, and increased to 66 percent between 2007 and 2012 (UN DESA, 2005; UNICEF, 2013).

The health of women in relation to fertility is fundamental to national health standards. Education and improved nutrition for girls and women, better access to modern birth control, spacing of pregnancies, and adequate care in all stages of pregnancy are the vital means to achieve improvement in women's reproductive health. Traditional birth attendants (TBAs) provide care during most deliveries in developing countries. There are no adequate substitutes for good prenatal medical care, but the work of TBAs can be improved by a strict program of licensing, training, and supervision (see Chapter 14).

Simple, inexpensive measures can improve outcomes: education about the right to care for safe pregnancy; routine iron and folic acid during pregnancy; prenatal care

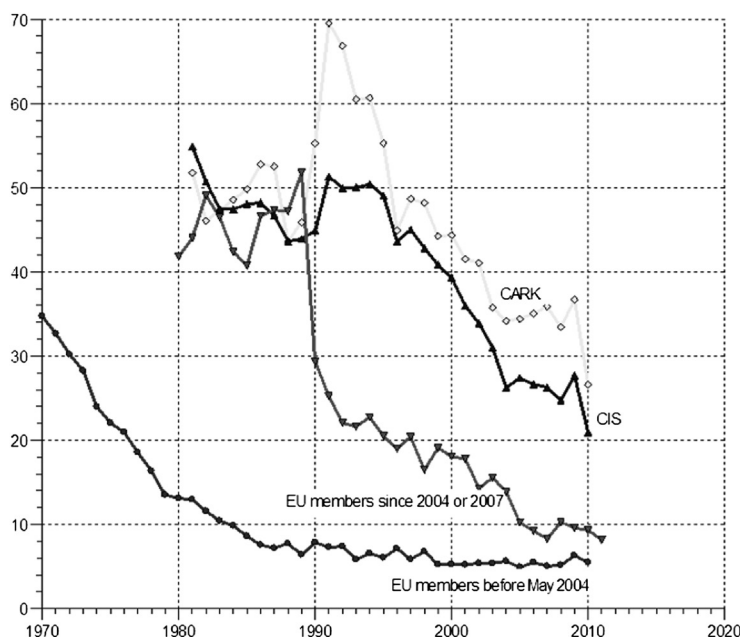


FIGURE 16.3 Maternal mortality ratios in sectors of the World Health Organization European Region, 1970–2011. Note: EU=European Union; CARK=Central Asian Republics; CIS=Commonwealth of Independent States. Source: World Health Organization, *European Region. Health for All database*; January 2013. Available at: <http://data.euro.who.int/hfad/> [Accessed 30 May 2013].

stations (maternal and child health); HIV and sexually transmitted infection (STI) screening and care; professionally supervised birth centers (in hospitals if possible); high-risk identification and referral systems (see Chapter 5); training, licensing, and supervision of traditional birth attendants; and deployment of well-trained CHWs for preventive health care (see Chapter 15) can all make a difference.

The failure to advance sufficiently in lowering maternal mortality in many countries is largely a failure of political will and initiative. The means (knowledge) to prevent most of these deaths is available, but applying the national and international will and investment of necessary resources to this task has been wanting. Safe motherhood has taken a back seat to HIV and child health in priorities in many countries with a high maternal mortality rate, and stagnation of effort and results has followed. A combination of international and national organization, improved databases, and program entrepreneurship is needed to reduce the staggering toll of maternal mortality, even in countries such as Nigeria with oil wealth, and India with rapid economic development.

Population Growth

Despite the fact that population growth is a religious and political controversy in many societies, falling birth rates are now seen in most parts of the world. Developing countries are increasingly recognizing that high fertility rates hinder economic development, perpetuating poverty, a fundamental cause of ill-health. The politics of population have traditionally rested on the assumption that population increase is essential for economic growth and national power. At the microlevel in traditional farming societies the assumption is that more children provide greater security for the family. In recent decades the expansion of family planning technology has been accompanied by a gradual shift to the view that unrestrained population growth is a barrier to economic development.

In many poor countries, high rates of population growth perpetuate poverty and ill-health for mothers and children. Improved child survival and reduced economic imperatives for more children to work farms or to contribute to family incomes have led most countries to lower overall birth rates. Higher education levels for women have increased knowledge and use of birth control. Religious injunctions against birth control no longer have the power to prevent use, so that birth rates have fallen worldwide, and in many countries to below replacement levels (i.e., negative population growth).

Despite the decline in fertility rates in most regions of the world, the world population has passed the 7 billion mark, is growing at an average annual rate of 1.73 percent, and will reach a predicted level of more than 9 billion in 2050. Asia

accounts for almost 60 percent of the world's population, and this will decline to 57 percent in 2050, while Europe is about 12 percent, but declining to an estimated 7.2 percent in 2050. Africa accounts for just over 13 percent of the world population but will reach a forecast 21.7 percent in 2050. Fertility rates are crucial for economic growth, as has been demonstrated in countries around the world. In many Asian countries, the birth rate has declined precipitously to rates close to those in developed countries. Over the period 1970–2011, crude fertility rates in East Asia and the Pacific fell from 36 per 1000 population, to 27 per 1000 population in 1990, and to 14 per 1000 population in 2011. In Latin America and the Caribbean crude birth rates declined from 36 to 18 per 1000 population from 1970 to 2011, and in the Middle East and North African Region from 44 per 1000 to 24 per 1000 in the same period. By 2011, the crude fertility rate declined from 47 to 37 per 1000 population. In CCE and CIS crude birth rates declined from 20 to 14 per 1000 population (UNICEF, 2013). [Table 16.10](#) shows population trends from 1960 to 1910 and projections to 2020 and 2030.

Many countries in sub-Saharan Africa will see their population double within 20 years, although even here there has been what appears to be the beginning of a decline in total fertility rates. Population growth is below replacement level in most industrialized countries and falling in most developing countries as well, but the fertility gap is still high, with growth rates of 1.5 percent currently and projected to decline to 0.5 percent by 2030. In 2011 the world fertility rate was 2.5, and 4.2 for developing countries (UNICEF, 2013).

Governments have a crucial role in family planning. Distribution of information and promotion of family planning as a national policy and priority must be part of a new emphasis on primary health care. In China in the 1950s, Chairman Mao Tse Tung called birth control a new form of

TABLE 16.10 World Population in Billions, by Development Level, Medium Variant, 1965–2030

Level of Development	1960	1980	2000	2010	2020	2030
Least developed regions	0.2	0.4	0.7	0.8	1.0	1.3
Less developed regions	1.8	3.0	4.3	4.8	5.3	5.8
More developed regions	0.9	1.1	1.2	1.2	1.3	1.3
Total world population	3.0	4.5	6.1	6.9	7.7	8.3

Source: United Nations, Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat. World population prospects: the 2010 revision. Available at: http://esa.un.org/unpd/wpp/unpp/panel_population.htm [Accessed 29 May 2013].

genocide of the developed countries against the developing countries. The legacy of this tragic pronouncement was no less destructive to public health than the pronouncements of religious bodies that still equate birth control with mortal sin. Both had the effect of promoting high fertility rates in those populations that can least afford the health and economic burden of raising large numbers of children. For the past four decades, birth control has been promoted in India and China, the two countries with the world's largest populations, but the momentum of population growth continues and is unlikely to level off in the next 20 years. In addition, China's one-child-per-family policy has reportedly led to female infanticide, forced abortions, and sterilization in a primarily rural society valuing male children.

A demographic transition occurs when the age makeup of the population shifts. As countries move from developing to a developed or industrialized status, population age patterns change. With greater life expectancy and declining birth rates, the ages of the population shift towards older age groups. Developed countries are experiencing a rapid growth of the "old-old" and "oldest-old" (i.e., over 75 and over 85 years old, respectively), more dependent population. These trends are of vital importance to the future of individual countries as they try to sustain or improve economic and social conditions. All countries need a working-age population sufficient to sustain the elderly and the young dependent groups.

High birth rates in developing countries still restrict the potential for economic growth, and the care and nurturing of children. Food supplies have been expanded by improved agriculture, but this may not be able to sustain high rates of population growth. In addition, rising standards of living and aspirations place further demands on natural resources and the environment, with great stress on the Earth's fragile ecology.

Malnutrition

Food production has increased in most parts of the world, but has steadily declined per capita in sub-Saharan Africa, although gross national product (GNP) per capita increased from US\$751 in 2004 to US\$1447 in 2011. Increased production in other parts of the developing world during the 1960s and 1970s slowed during the 1980s. In developing countries, the capacity to produce food faster than population growth is limited. The developed countries, with one-quarter of the world's population, produce over half of the world's food supply. They dominate food production but have low rates of population growth. Developing countries may purchase this surplus of food, but many lack the hard currency to do so. GNP alone cannot measure wealth; it must also be weighed in terms of the capacity to produce food, its affordability and ease of access, awareness of nutritional preferences for good health and food quality and

safety, and some basic foods fortified with essential minerals and vitamins.

Hunger, adaptation, and starvation are difficult to measure. Hunger is a subjective phenomenon; adaptation occurs when people adjust to lower energy intake; and when energy output exceeds intake, starvation occurs. Starvation may be acute or chronic. Hunger and famine are associated with natural disasters and war, but they also occur chronically in settings where food production cannot keep up with population growth. Although hunger and famine affect all ages and genders, the most vulnerable groups in the population are infants and children, pregnant women, women as a whole, and the elderly. Men are affected in terms of reduced capacity to work. The Chinese famine of 1959–1961, one of the most tragic disasters of the twentieth century, killed up to 36 million people.

Estimating the number of people lacking food is difficult because of limited data. Few countries maintain monitoring systems of national nutrition status because of a lack of financial and human resources. The nutritional status of the population, more specifically of children, is usually measured by birth weight, weight-for-age, and height-for-age. Low height for a given age, or stunting, is the most prevalent symptom of protein–energy malnutrition (PEM). Approximately 40 percent of all 2-year-olds in developing countries are stunted. The prevalence of stunting may be as high as 65 percent in India, about 40 percent in China and sub-Saharan Africa, and more than 50 percent in the rest of Asia. According to WHO standards, some 780 million people worldwide are estimated to be energy deficient or in a state of PEM. This is not always manifested by hunger, but rather represents long-term inadequate food intake, especially protein and calories for energy needs. Malnutrition may be so widespread among children that parents and health providers assume the children's lethargy and stunting to be normal.

Micronutrient deficiency conditions affect some 2 billion people worldwide, with serious sequelae including premature death, poor health, blindness, growth stunting, mental retardation, learning disabilities, and low work capacity. Iodine, iron, and vitamins A, B, C, and D are commonly deficient in diets in developing countries, adversely affecting the health of the whole population but especially vulnerable subgroups. Iron deficiency is the most common of these, affecting mainly women and children but also men and the elderly. In developing countries, children and women are especially vulnerable because of frequent child-birth and poor diets. Poor nutrition is the underlying contributor to excess deaths of children and women in relation to pregnancy and early life of the premature newborn, and it is underaddressed in global program implementation.

Iron deficiency and iron-deficiency anemia are, as discussed in Chapter 8, the commonest nutritional deficiencies globally. They are primarily associated with low

dietary intake of iron rich foods, female gender and menstrual functions, single or multiple pregnancies and other deficiencies such as vitamin C, as well as concomitant infections or parasitic diseases or other chronic conditions such as renal disease. In industrialized countries, anemia of pregnancy affects 18 percent of pregnant women, but 40 percent are affected in China and Latin America and 88 percent in India. Iron deficiency in Russian women exceeds 50 percent, and iron supplementation is not routinely practiced; there is a lack of hemoglobin testing. Iron deficiency in infancy causes reduced growth (in height) and potential learning capacity in school. In adults, it reduces work potential. Distribution of inexpensive iron (ferrous sulfate) to pregnant and lactating women could largely prevent this onerous health burden, which is estimated by the WHO to affect 1.8 billion people.

Iodine-deficiency disorders (IDDs) have been identified as one of four key global risk factors for impaired child development. Iodine deficiency affects some 1.88 billion people: almost one-third of the global population, including 241 million schoolchildren, still lack sufficient dietary iodine intakes. Annually, 38 million or nearly 30 percent of the world's newborns born every year are unprotected from brain damage due to IDD. The severity of iodine deficiency varies from subclinical deficiency to cretinism and severe retardation. Even subclinical brain damage of the newborn handicaps the affected child for life. Iodine is deficient in soil and water in many parts of the world, and deficiency conditions at subclinical and clinical levels are widespread. Routine iodization of salt has been recommended by the WHO, UNICEF, and many other organizations for decades. It is widely used to prevent IDDs and has been adopted as a major objective of the 1990 World Summit of Children, along with elimination of vitamin A deficiency, but implementation remains problematic even in Western Europe, and more so in low- and medium-income countries. Global iodine fortification has markedly improved over the past decade and the number of iodine-deficient countries decreased from 54 in 2003 to 32 in 2011.

Iodine deficiency remains a major global health problem, even in countries with iodization, but is poorly monitored in Europe, the Eastern Mediterranean, and sub-Saharan Africa. Regions with the greatest proportions of children with inadequate iodine intake are reported to be in the European (52.4 percent) and Eastern Mediterranean (48.8 percent) Regions. The International Council for the Control of Iodine Deficiency Disorders (ICCIDD) works with a network for the Sustained Elimination of Iodine Deficiency, including UNICEF, WHO, Kiwanis International, and the US Centers for Disease Control and Prevention (CDC), and the global salt industry. The WHO estimates the cost of eradication of iodine deficiency by iodination of salt at US \$0.05 per person per year (Salt Institute, 2011; Andersson, 2012). Progress is being made, with some outstanding

successes in salt fortification in countries such as China, Nigeria, and Georgia in the past decade, but much more remains to be done.

Vitamin A supplements reduce mortality from measles and prevent xerophthalmia and blindness in children. This knowledge has created a major change in public health nutrition needs in developing countries by demonstrating nutritional comorbidity and the vital importance of nutritional interventions to prevent morbidity and mortality in vulnerable population groups. The extent of iodine and vitamin A deficiency conditions is enormous and entirely within the scope of current technology to prevent at low cost. Elimination of vitamin A deficiency can be achieved by giving vitamin A capsules to children over 6 months of age three times per year at a cost of US\$0.10 per capsule, dietary modification to promote vitamin A-rich foods, and/or fortification of basic foods (oil, margarine, milk, or sugar).

Food fortification is now recognized as a major need and cost-effective intervention necessary in all countries, particularly those in the middle and lower levels of development. Since the 1990s, fortification of flour with folic acid has been implemented in a number of countries to prevent birth defects (neural tube defects). This has provided a new impetus to promote food fortification, and new deficiency conditions of public health importance are reported for vitamin D, vitamin K, vitamin B complex (including B₂), selenium, zinc, and others (see Chapter 8). The WHO issued new guidelines for food fortification in 2006, which have great importance in international aid and development policies for the second decade of the twenty-first century.

In many countries in the African, South-East Asian, and Eastern Mediterranean Regions, infectious and parasitic diseases occur in association with malnutrition and continue to be major public health problems. The infection-malnutrition comorbidity causes much of the mortality among infants and children and shortens life expectancy (see Chapter 6).

Nutritional security, including food adequacy and prevention of micronutrient deficiencies, along with the prevention of obesity and diabetes, are central issues in improving health and reducing mortality globally, and should be given a central place in post-MDG and global funding priorities.

The Fight Against HIV/AIDS and Other Communicable Diseases

Globalization of the spread of disease is as old as the migration of humans, animals, or disease vectors. The emergence of the AIDS pandemic has affected all countries of the world, regardless of their level of development. In 2008 the WHO lowered its estimates of HIV-infected people globally to between 30 and 37 million: it had previously been

estimated that around 40 million people in the world are infected with HIV, of which Africa alone has 25 million. More than 10 million children in sub-Saharan Africa have been orphaned by AIDS. The prevalence rate of HIV infection among adults in sub-Saharan Africa was estimated to be more than 7 percent in 2004. Although the prevalence rate of HIV in countries in Asia, especially in India and China, seems to be low, there is a definite potential danger of epidemics if not controlled soon. The youngest population of the world resides in China and India and worldwide about one-third of those currently living with HIV/AIDS are between 15 and 24 years of age. This figure is rising and with the rising level of substance abuse there is an urgent need for concerted international action.

As discussed in Chapter 4, the emergence of “new” infectious diseases and the reemergence of well-known but still uncontrolled diseases pose great challenges for public health and clinical care. The problems of these diseases are compounded by the rise of resistant microbial strains. The basic priorities in control of infectious diseases remain the need for universal coverage with childhood immunization; high standards of food and water safety and sanitation; education to reduce the spread of HIV and STIs; improved primary care for prevention, diagnosis, and management of TB and malaria; and provision of antimicrobial therapy. Education and behavior are still crucial, while new interventions such as circumcision and condom use reduce transmission. It is to be hoped that an effective, safe, and inexpensive vaccine against HIV will soon be developed.

The HIV epidemic has engulfed the economies of many nations and has been the cause of the rising spread of poverty, reversal of human development, worsening health inequalities, and crippling government machineries in various parts of the world, thus reducing the provision of essential services. The very obvious health inequalities observed in the world led the WHO to declare a global health emergency to combat HIV/AIDS when it was found that only 5 percent of those in the developing world who require antiretroviral therapy (ART) receive it. It will be a pity if one part of the world is oblivious to the health situation in the other, not only for moral reasons but also for practical ones; as the world is a global village, ill-health in one part of the world will definitely affect the other parts.

Malaria remains endemic in many poor countries, especially in the tropical and subtropical regions of Africa, the Americas, and Asia. Although successful treatment and prevention methods for malaria have been available for a long time, there are still an estimated 154–289 million clinical malaria cases, and about 600,000 (uncertainty range of 490,000–836,000) deaths from malaria every year. Approximately 3.3 billion people, almost half the world’s population, live in malaria-endemic areas, making them vulnerable to the disease. Increased prevention and control measures have led to a reduction in malaria mortality rates by more

than 25 percent globally since 2000 and by 33 percent in the WHO African Region. Factors include the increasing availability of bed nets impregnated with insecticide, indoor spraying with insecticide, greater awareness of the importance of vector control, and improving diagnostic procedures. However, resistance to currently available drugs is a worrying factor in malariology and the long hoped-for vaccine still remains an unfulfilled dream. Genetic modification of mosquitoes to prevent their transmission of the parasite, and biological methods of vector control by larva-eating bacteria are promising but still not game changers in malaria control.

Tuberculosis is a disease which experts thought could be eradicated in the 1970s, but it reemerged as one of the major killer diseases in the world, partly because of comorbidity with HIV. If TB is detected early and fully treated, people with the disease quickly become non-infectious and are eventually cured. Most are treated with directly observed therapy, short course (DOTS), which has been highly effective in completion of treatment that is needed even after symptoms recede. In 2011, an estimated 5.8 million new cases of TB occurred; there were 1.4 million deaths, including half a million HIV-associated TB deaths. TB is a global phenomenon but is mainly restricted to poor countries where it has been increasing, particularly in sub-Saharan Africa and South Asia, and is compounded by the additional problem of multidrug-resistant organisms. Multidrug-resistant tuberculosis (MDR-TB) and extremely drug-resistant tuberculosis (XDR-TB), HIV-associated TB, and weak health systems are major challenges. TB is high on the agenda of the MDGs, with the goal to reduce the burden of TB, and the target to reduce by half TB deaths and prevalence by 2015 has been achieved with the help of international donor agencies and national governments. New cases of TB have been falling since 2006 and fell at a rate of 2.2 percent in 2011.

Important policy and technological advances are needed before TB, HIV, and malaria can be controlled globally, but much can be accomplished with existing technology. Providing ART and risk-reduction measures at primary care levels, along with antimalarial activities, is essential to control current epidemics. New diagnostic methods and vaccines research may provide more effective preventive measures, but improved use of current methods can markedly reduce the toll of these diseases.

Preventable deaths in developing countries can be avoided by many measures of proven effectiveness at relatively low cost. Currently available vaccines for children can eliminate deaths from measles, and markedly reduce deaths from diarrheal and respiratory diseases, which are major causes of death and disability. Relatively new but well-established vaccines are being gradually incorporated in internationally supported vaccination programs in developing countries, including *Haemophilus influenzae*

b (Hib), pneumococcal pneumonia, and rotavirus, but influenza, hepatitis A, and varicella vaccines are not yet widely used in developing countries. WHO with UNICEF, GAVI, national governments and many other partners have declared “the Decade of Vaccines (2011–2020) is of a world in which all individuals and communities enjoy lives free from vaccine-preventable diseases”. This means not only increasing routine immunization to all children especially. But equally important is expanding the kinds of vaccines used to include those developed in recent decades and reducing the time lag from their proven success until their adoption globally (GAVI/WHO/UNICEF 2012).

Along with immunizations, nutrition counseling and monitoring of child development are vital, along with supplementation providing vitamin A, iron, and iodine, and deworming treatments. These give children greater resistance to infectious disease and encourage healthy development. Environmental control measures such as the widening use of insecticide-coated bed nets, DDT spraying of homes, and actions to reduce environmental conditions ideal for mosquito breeding are helping to reduce child mortality from malaria.

Currently available public health measures are saving millions of lives and could save many more if applied in organized and sustained programs. It is hoped that breakthroughs in the development of new antimicrobial therapies and vaccines for HIV, TB, dengue, and malaria to address the multidrug-resistant organisms will be achieved in the second decade of the twenty-first century and help to accelerate the revolution in global health that is now underway.

Improved food technology will be needed to prevent *Salmonella* and *Escherichia coli* from infecting food sources. Medical care will need to improve its methods of control of infectious diseases to avoid the emergence of resistant

organisms through more restrained use of antibiotics. The achievements towards eradication of important infectious diseases such as smallpox, polio, measles, guinea worm, leprosy, and onchocerciasis provide a basis for cautious optimism even though tempered by realistic appraisal of unsolved and new challenges of infectious diseases.

Non-Communicable Diseases

Tobacco is one of the largest causes of preventable deaths globally, killing between one-third and half of those using it from ischemic heart diseases, stroke, and chronic lung disease, and accounting for between 5 and 8 million deaths per year (WHO, 2008). Progress in the industrialized countries in reducing all smoking, however, masks a large increase in teenage smoking. The tobacco interests promote smoking in developing and transition countries, which are less able to carry out the legal and other issues associated with prevention of smoking. Antismoking legislation has advanced in North America and in the EU, but smoking remains one of the great challenges of public health.

The WHO, in its World Health Report 2003, used the term *neglected global epidemics* to emphasize three important and growing threats to the world: CVDs, tobacco, and motor vehicle accidents (Figure 16.4). Developing countries suffer from the dual burden of communicable diseases and increasing rates of NCDs and injury. These conditions are now greater causes of morbidity and mortality than the communicable diseases affecting the poorest countries around the world and the poor in the developed countries. Risk factors for CVDs are indicative of future health status, and five of the top 10 risks worldwide are specific to NCDs, namely, elevated blood pressure, tobacco use,

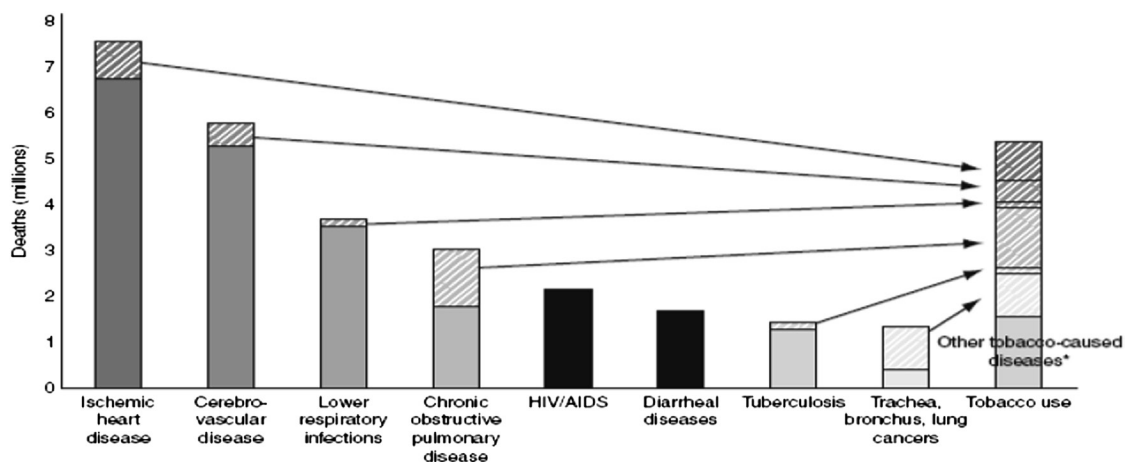


FIGURE 16.4 The eight leading causes of death worldwide and deaths attributable to tobacco use, 2005. Note: Hatched areas indicate proportions of deaths that are related to tobacco use and are marked according to the column of the respective cause of death. *Includes mouth and oropharyngeal cancer, stomach cancer, liver cancer, other cancers, cardiovascular diseases other than ischemic heart disease and cerebrovascular disease, diabetes mellitus, and digestive diseases. Source: World Health Statistics 2008, Part 1, Ten highlights in health statistics. Available at: http://www.who.int/whosis/whostat/EN_WHS08_Part1.pdf [Accessed 16 January 2014].

alcohol abuse, increasing fat consumption with cholesterol, and obesity (World Health Report 2000). An estimated 32 million deaths are attributable to NCDs and around 16.7 million are because of CVD (WHO, 2003 and 2013) (Figure 16.4).

In developing countries such as India, CVDs have become the leading cause of death, responsible for one-third of all deaths. Developing countries have double the number of deaths due to CVD in comparison to developed countries. Overall, in developing countries, CVD ranks third in disease burden (after injuries and neuropsychiatric disorders). Even in high-mortality developing countries, CVD morbidity is ranked very high. The major risk factors for CVDs have been identified, even while mortality rates are declining (see Chapter 6), and their effects through globalization can be seen all over the world with diets rich in saturated fats, sugar, and salt in vogue everywhere, along with increasing sedentary life habits. With the lack of fruits and vegetables in the diet, increase in tobacco use and lack of physical activity, the “global” diet leads to an increase in cases of CVD worldwide.

The epidemiological transition from predominance of infectious diseases to the chronic conditions that occurred in the industrialized countries by the mid-twentieth century is also occurring in the middle- and even low-income developing nations. CVDs, cancer, other degenerative conditions and mental disorders, and trauma are already the major causes of death in many developing countries. Trauma also constitutes a vast public health issue, with serious individual, social, and economic consequences. The WHO reports that in 2008, 7.3 million deaths occurred from ischemic heart disease and another 6.2 million from strokes (WHO, CVD, 2013). More than 5 million deaths from injury and poisoning are reported

yearly, accounting for 9 percent of global deaths, with 90 percent occurring in low- and middle-income countries, and they result in considerable loss of potentially productive years of life. Motor vehicle accidents rank first in causality, followed by domestic accidents, including falls, burns, poisonings, and drowning, all of which are particularly prevalent among young and elderly people.

The prevalence of obesity worldwide, highest in the Americas, more than doubled between 1980 and 2008. Obesity is a major and rapidly increasing phenomenon in high-, medium-, and low-income countries, due to dietary practices and sedentary lifestyles. Two billion people suffer from one or more micronutrient deficiencies, while 1.4 billion are overweight, of whom 500 million are obese (FAO, June 2013). Twenty-six percent of all children under five are stunted and 31 percent suffer from vitamin A deficiency. In sub-Saharan Africa underweight DALYs declined from 694 in 1990 to 278 per 1000 population in 2010 (Table 16.11). Even in Africa, DALYs related to overweight increased.

Obesity has become a world pandemic. A survey in England predicted that more than 12 million adults and 1 million children would be obese by 2010 if no action was taken. In the USA the high and rising prevalence of overweight and obesity makes this perhaps the leading public health problem. From 2000 to 2011, the prevalence of obesity increased from 27.5 to 35.5 percent in adults, and overweight in children and adolescents tripled. Currently, some 78 million, or more than one-third of US adults are obese, with almost half of black adults in that category. Obesity affects 12.5 million children and adolescents. The prevalence of obesity and overweight in the USA varies among the states, with a greater prevalence among the southern states. The US rate of overweight and obese categories combined continues to

TABLE 16.11 Disability-Adjusted Life Years (DALYs) by Malnutrition-Related Risk Factor, Population Group and Region, 1990 and 2010

Region	Child and Maternal Malnutrition		Underweight				Overweight and Obesity			
	Total DALYs (thousands)		Total DALYs (thousands)		DALYs per 1000 population (no.)		Total DALYs (thousands)		DALYs per 1000 population (no.)	
	1990	2010	1990	2010	1990	2010	1990	2010	1990	2010
World	339,951	166,147	197,774	77,346	313	121	51,613	93,840	20	25
Developed regions	2,243	1,731	160	51	2	1	29,956	37,959	41	44
Developing regions	337,708	164,416	197,614	77,294	356	135	21,657	55,882	12	19
Africa	121,492	78,017	76,983	43,990	694	278	3,571	9,605	15	24

Source: Food and Agriculture Organization. The state of food and agriculture, 2013. Available at: <http://www.fao.org/docrep/018/i3300e/i3300e.pdf> [Accessed 3 June 2013].

rise, with a prevalence of 69 percent among adults. Obesity contributes to risk factors for heart disease, hypertension, diabetes, stroke and cancer, which have substantial DALYs and impact on the economy.

Diseases related to smoking, overeating, and unhealthy diet are increasing in developing countries among the middle-class and working-class populations. Rising death rates from coronary heart disease and strokes in the former Soviet countries constitute an enormous contributor to premature death and a burden on underfinanced health systems. As infectious diseases are better controlled and as eating patterns shift in the urban middle and working classes to high meat and fat intake, patterns of CVD seen in the industrialized countries are occurring in developing nations. Public health practitioners need to prepare for this epidemiological transition with interventions such as antismoking campaigns, nutrition education, and other health promotion programs. Similarly, the mental, dental, and other health needs of societies are part of global health planning for developed countries in transition.

Mental health is gaining increasing recognition as a health issue of global proportions affecting hundreds of millions with moderate to severe disability, not only in the industrialized countries, but also in developing countries. As measures of the burden of disease include morbidity as well as mortality (such as in DALYs), major depression (unipolar), alcohol dependence, bipolar disorders, and especially schizophrenia come high on the list of causes of disability, particularly in young adults aged 15–24. These require attention in the health system and especially in primary care. Drug abuse and comorbidity with personality disorders and other mental illnesses are global problems, associated with related issues such as HIV, STIs, TB, hepatitis B and C, violence, crime, and other destructive behavior with great cost to society.

National and international bodies responsible for population health are aware of the magnitude of NCDs and the related risk factors. This constitutes a core issue for public health and social policy for the coming decade at least. Paradoxically, mortality from CVDs and cancer is falling in the high-income countries, but increasing in the middle- and low-income countries. The lessons learned in NCD control need to be central to bilateral and international aid programs along with the traditional emphasis on HIV, vaccine-preventable disease, and maternal and child health. Proposals for the post-MDG period are being widely discussed and will become part of policy for global health and for funding agencies. A modified outline is suggested in [Table 16.12](#) (see Chapters 5 and 6).

Disaster Management

Tragic events leading to large-scale loss of property and life created by nature and by humans require organized

international response to limit the damage, to reduce suffering, and to restore normality. These situations may be natural disasters such as hurricanes, floods, droughts, earthquakes, or volcanic eruptions, with severe consequences for public health. They may be larger scale events created by human initiatives, such as bi-national and civil wars, genocide, and civil strife or repression. Such events can take on enormous proportions as displacement, murder, and other forms of violence disrupt human norms and civil society.

The public health aspects of such events lie within the context of restoration of safety, provision of safe water, shelter, food, and sustenance, and efforts to restore civil life. Such events are now brought to the immediate attention of the world's community in television coverage. International action is forthcoming, but often inadequately coordinated as local civil and security authorities are overwhelmed. Preparation and organization for such disasters are important elements of global health. The 2004 tsunami in South-East Asia, with massive loss of life and property, repeated floods, and other disasters, resulted in large-scale displacement of people and public health challenges of the most basic kind. Provision of safety, shelter, safe water and food, disposal of the dead, and many other burdens can overwhelm local resources and require national and international assistance to reduce the scope of the tragedy and to help restore normal life (see Chapter 9).

Investment in infrastructure to ensure safety and prevent collapse of buildings during earthquakes, floods, tsunamis, civil strife, or war can save thousands of lives. Incitement of religious and political strife can lead to large-scale death and injury, so that prevention of incitement should be a political priority. Investment in preparation and training of first responders, such as police, firefighters, emergency medical teams, food and shelter supplies, and many other methods of reducing the scale of damage and injury, is a vital function of civic authorities, public health, emergency transportation, and hospital facilities. The twenty-first century will continue to experience natural and human-caused disasters with huge loss of life, breakdown in civil society, and loss of personal security from shelter, food, water, warmth, and family contact.

Environment

The environment is a global health concern, not only because it affects every country but also because its maintenance requires joint action. Air pollution caused by industry, power plants, and domestic use of coal is common in urban areas worldwide. The quality of air in the industrialized countries improved over the 1980s and 1990s, but in many developing countries and the former

TABLE 16.12 World Health Organization Proposals for Global Control of Non-Communicable Diseases (NCDs)

Target	Measures
Reduce premature mortality from NCDs by 25%	Education, regulation, taxation
Reduce harmful use of alcohol by 10%	Education, taxation, legal enforcement
Reduce physical inactivity by 10%	Education, school programs, public facilities in parks
Reduce sodium intake by 30%	Mandatory regulations for processed foods
Reduce tobacco use by 30%	Ban advertising and smoking in public places; increase taxation; implement international tobacco agreements
Reduce elevated blood pressure by 25%	Promote education of physicians, patients and their families, and the general public on dangers and control of elevated blood pressure
Diabetes/obesity: 0% increase	Promote school and public education; school restrictions on sweet beverages and dispensers; healthful diet in institutions
Mental health, drug therapy, and counseling: 50% coverage	Train GPs and primary care workers in mental health issues; increase access to drug treatment centers, and family doctor counseling management of methadone
Essential NCD medications and technologies: 80% coverage	Promote preventive medications such as aspirin, statins, and antihypertensive medications for prevention of development of ischemic heart disease with treatment of medicines and counseling (including glycemia control) to prevent heart attacks and strokes; promote use of generics for aspirin, statins, antihypertensive medications; increase capacity for PTCA and stent insertion for acute coronary events
Training, organization, and reporting systems for primary care	Strengthen reporting and data systems; develop medical and specialty training; train and deploy community health workers to actuate education at worksites, schools, hospitals, and clinics
Health protection measures	Promote sanitation, antimosquito vector control, and bed net use. Implement full immunization of children (DPT, polio, MMR, rotavirus, Hib, pneumococcal pneumonia, influenza) and adults (hepatitis B, HPV, tetanus, diphtheria)
Healthful diets; promote nutrition security, reduce malnutrition and micronutrient deficiencies	Ban trans fats; reduce animal fats; increase vegetable, olives, nuts, and whole grain; promote fruit and vegetable production and availability at low cost; food fortification with folic acid and vitamin B ₁₂ in flour, vitamin D in milk, and iodine in salt, with monitoring; school meals; multivitamin supplements to women before and during pregnancy; cereal consumption
Promote screening for cancer	Pap smear, colonoscopy, breast examination
Healthful fertility, delivery and newborn care	Promote contraception, spacing of pregnancies, folic acid and iron for women in age of fertility, antenatal care and safe delivery; vitamin K and immunizations for newborns, antibiotics for newborns where neonatal mortality is high
Healthful aging	Community social centers for the elderly; home care and hospice care centers
Mental health	Educate primary care providers in diagnosis and management of mental health problems; develop community-based mental health capacity of trained personnel and accessible facilities

Note: GP=general practitioner; PTCA=percutaneous transluminal coronary angioplasty; DPT=diphtheria-pertussis-tetanus; MMR=measles-mumps-rubella; Hib=*Haemophilus influenzae* type b; HPV=human papillomavirus.

Source: Adapted from World Health Organization. NCD global monitoring framework, 2013. Available at: http://www.who.int/nmh/global_monitoring_framework/en/ [Accessed 29 May 2013].

socialist countries, air quality has deteriorated because of poor quality in power generation and urban congestion. Excessive production of carbon dioxide by the use of fossil fuels is contributing to a global warming effect, and chemicals used in industrialized societies cause ecological damage, with potentially serious global consequences. Climate change is an overarching issue affecting health, economics, political developments, and human society generally (see Chapter 9).

Global Partnership for Development

The eighth goal in the MDGs calls for a partnership between the developed and the developing world, and official development assistance (ODA). The ODA includes measures to ensure debt sustainability on a long-term, rule-based basis, along with predictable and non-discriminatory multilateral trading, and financial systems to address the special needs of the least developed countries. The developed nations

undertook to share responsibility for ensuring the global partnership. The UN General Assembly proposed an ODA target of 0.7 percent of the donors' national income but the OECD countries have contributed to just around half of the promised amount for many years, which fell to about one-third in the 1990s. World leaders met in 2002 at the International Conference on Financing for Development in Monterrey, Mexico, and established a new framework for a global development partnership (MDG8) (Table 16.3). Since then, the signatories have started to deliver on commitments made during the conference and aid has reached a record high of US\$79 billion, with countries such as Denmark, the Netherlands, Norway, and Sweden honoring the initial commitment in the Declaration by the UN General Assembly.

It is vital for developing countries to increase their participation in the global economy, and this depends on reduction in trade barriers imposed by developed countries on imports from developing countries and tariffs on goods that are strategically important to developing economies, such as textiles, clothing, and farm products. Steps need to be taken to write off the debts on very poor countries, especially the economically stagnant African economies.

Economic growth in Africa since 2000 has been strong and grew by 4.3 percent in 2010 and 5.3 percent in 2011 based on high prices and growing investment in commodity production. However, this has not been translated into increased employment, industrial development, or investment in infrastructure, social, and health programs. The contrast with East Asian growth is startling: in East Asia, GDP grew from US\$305 per capita in 1970 to US\$8483 in 2010 (an average annual growth of 60.6 percent), while Africa's growth was from US\$246 per capita to US\$1701 in the same period, a respectable average annual increase of 14.8 percent. The total debt burden on African economies was estimated to be US\$206 billion at the end of 2000, reaching US\$300 billion in 2009 (UN Economic Commission for Africa, 2013).

DEVELOPMENT AND HEALTH

Environmental conditions are profoundly related to health. Some 1.3 billion people in developing countries lack access to clean water; nearly 2 billion lack adequate sanitation. Improved access to sanitation facilities globally within the MDG7 objective of environmental sustainability has resulted in more than 2 billion people gaining access to improved drinking water, increasing the global coverage from 76 percent in 1990 to 89 percent in 2010. Important progress has been made in urban slums. Despite this progress, 2.5 billion people in developing countries still lack access to improved sanitation facilities (UN, MDG7, 2013).

Poverty, low educational and job skills, poor nutrition, an unsanitary environment, and poor housing conditions all contribute to the enormous burden of disease in developing countries. Indoor pollution from the use of cooking fuels with inadequate ventilation in developing countries contributes to high rates of acute respiratory disease and deaths in children, as well as to chronic lung disease in the elderly.

Health status and economic development are interdependent, and the prevailing social and political philosophies have a vital impact on health, not only in terms of the amount of the funds allocated to health, but also in the form of the health care delivery system adopted. Rapid economic development also has its price. Environmental pollution and increases in occupational health hazards occur when new technology is transferred to developing countries. Further degradation also occurs with the tendency of the rural poor to move to cities, where basic sanitation and other infrastructures are often lacking.

Measurement of economic development by GNP alone is misleading. The distribution of wealth in a country is an important variable, along with other measures such as school enrollment. The Human Development Index (HDI) includes life expectancy, educational attainment, and measures of income (giving lower weight to income above the poverty level, since extra income for upper income groups is less important to survival). The HDI, along with DALYs and quality-adjusted life years (QALYs) (see Glossary and Chapters 3 and 11), adds an element of the quality of life to the usual economic indices.

Equally important to the amount of money spent on health is how the money is used. Some countries have succeeded in achieving marked improvements in health while remaining poor as measured by GNP per capita. Some countries have higher ratings in terms of HDI than their ranking by GNP. China, with a GNP per capita of US\$410 in 1993 rising to US\$4940 in 2011, has succeeded in attaining the infant mortality and life expectancy rates of mid-level developing countries by bringing primary care to the vast rural population. Sri Lanka, with a per capita GNP of US\$498 in 1993 rising to US\$2580 in 2011, has an infant mortality rate of 15 per 1000, comparable to well-advanced developing countries. The Indian state of Kerala is well above Indian national standards in HDI, even though economically poorer than the national average. On the other hand, some countries with high per capita GNP have lower HDIs; for example, Kuwait and Saudi Arabia have large GNP per capita but fewer public health achievements than much poorer countries such as Cuba, Costa Rica, and Jamaica. In some countries, this may be due to the large economic gap between the small, very wealthy ruling class and the large, poor population.

ORGANIZATION FOR INTERNATIONAL HEALTH

As seen in Chapter 1, from the decline of the Roman Empire in the fifth century CE, Europe passed into a millennium of scientific repression. Knowledge, including medical knowledge, passed into the hands of the Church, and the Greek and Roman writings that were preserved in the west survived in isolated monasteries of Ireland and Europe, and in Arab civilization, where during the next few hundred years Arabian, Byzantine, and Jewish scholars translated and preserved ancient medical knowledge in Europe. In the ninth century, a medical school was founded in Salerno near Naples, and medical schools spread to cities throughout Europe and the Arab world.

European colonial expansionism, beginning in 1415 with the Portuguese attack on Muslim settlements in nearby North Africa, had extremely important effects on international health. European ships brought smallpox and measles to the natives of the South Pacific and the Americas, decimating their populations. Syphilis, possibly originating from yams, may have been introduced into Europe by sailors returning from the Americas. European adventurers and settlers often suffered severely from the many endemic diseases to which they had scant resistance. In addition, the slave trade brought communicable diseases from Africa to favorable habitats in the Americas.

Colonialism led to near-eradication of many of the world's native peoples and changed the character of many populations, most dramatically in North America, Australia, New Zealand, South Africa, and Latin America. Colonial governments introduced western medical organization and practice, including public health and professional education systems, and influenced health with respect to concepts of causality and the treatment of diseases. Widespread education and medical training were important legacies in many developing countries that gained their independence in the mid-twentieth century.

The development of sanitation and later microbiology depended on the scientific and technological underpinning provided by the industrial revolution. In the latter half of the nineteenth century, repeated epidemics of cholera in Europe and continuing havoc from other communicable diseases were intense stimuli for researchers to identify the causal agent and means of transmission of almost every major bacterial and parasitic disease. Asiatic cholera arrived in Europe in 1832 and spread throughout the continent in repeated epidemics during the nineteenth century. This led to a convening of the International Sanitation Conference in Paris in 1851, with follow-up meetings held in 1874, 1881, and 1885. These conferences were held more frequently between 1892 and 1903 regarding maritime quarantine and control of international transmission of cholera, yellow

fever, and typhus. In the early 1880s, a pioneering step in international public health occurred when, at the request of the International Cholera Commission, Robert Koch led a team to investigate cholera epidemics in Egypt. This resulted in identification of the *Vibrio cholerae* organism and recommendation of preventive procedures.

The Health Organization of the League of Nations (1921–1946), established in Geneva, was an attempt to develop the idea of international collective security for health. As part of its function, the Health Office provided an Epidemic Intelligence Service. The Health Office organized many expert committees on infectious diseases and other public health problems, including the establishment of standards for biologicals, maternal and child health, nutrition, health insurance, and medical education. Malaria, leprosy, and rabies control activities were promoted, as were the establishment of cancer registries and preparation for an international classification of disease; pharmacopoeias were coordinated and standards for housing and nutrition developed. The scope of organized international work was broadened from prevention of international transmission of disease to disease control and improved health conditions for vulnerable groups in the population. The collapse of peace in the late 1930s led to the League of Nations being disbanded.

During World War II, the United Nations Relief and Rehabilitation Agency was established by the allied powers to assist in the resettlement of millions of displaced people. This became part of the initiative to establish a new international health organization as part of an international consensus to build a better world after the war, in the context of a stronger, more coordinated United Nations. In the postwar period, international organization for health was seen to be a crucial need for world peace and progress.

WORLD HEALTH ORGANIZATION

The World Health Organization (WHO) was founded in 1948 as a UN agency in the spirit of cooperation and idealism following World War II. The WHO charter states that one of the fundamental rights of every human being is “the highest attainable standard of health”, and the UN’s Universal Declaration of Human Rights in 1948 stated, “Everyone has the right to a standard of living adequate for the health and well-being of himself and his family”.

The WHO has made an enormous contribution to global health. It serves as the central, unified, intergovernmental organization representing all countries and covering all fields of health. The WHO consists of 193 member states working together and with other organizations towards the achievement of the highest possible level of health. It replaced previous organizations, especially the Health Organization of the League of Nations and the Pan American

BOX 16.3 Successful Areas of International Health Leadership

Successes and important initiatives of the international health movement led by the WHO and UNICEF include the following:

- Eradication of smallpox
- Massive increase in immunization coverage (EPI)
- Control and closing in on eradication of poliomyelitis
- Reduced measles incidence (decline in deaths from 535,300 in 2000 to 139,300 deaths in 2010)
- Massive reduction in incidence of tetanus, diphtheria, pertussis
- Tuberculosis control using DOTS and DOTS-plus for multidrug-resistant cases
- Improving control of diarrheal disease (CDD) and reduced death rates
- Improving control of acute respiratory illness (ARI)
- Improved control in neglected tropical diseases: onchocerciasis, leprosy, yaws; potential eradication of dracunculiasis
- Leadership in principles of primary health care: influence on national health programs in developing countries
- Raising public and political consciousness of health issues
- Health for All initiatives
- Health targets initiatives
- The Healthy Cities movement
- Health promotion, raising health in national priorities
- Increasing awareness of health information needs
- Intersectoral cooperation in vaccines and immunization purchase, distribution and delivery
- GAVI, Gates Foundation, and public-private sector cooperation in global health
- Health systems reforms
- Health human resources issues
- Global tobacco control
- Millennium Development Goals promotion and achievements
- International Health Regulations
- Post-2015 health targets.

Note: WHO=World Health Organization; UNICEF=United Nations Children's Fund; EPI=Expanded Programme on Immunization; DOTS=directly observed treatment, short-course; GAVI=Global Alliance for Vaccines and Immunization.

Sanitary Bureau. A Technical Preparatory Commission developed the organization and, in the new optimism of the time, undertook the enormous task of dealing with global health problems. Its direction and coordinating functions are the primary assets of the organization, especially in the definition of health goals and in initiating international cooperation to achieve them.

The WHO carried this optimistic approach further in the Alma-Ata Conference and Declaration of 1978, in the successful pursuit of smallpox eradication and great success in nearing polio eradication, in major reduction of measles morbidity and mortality, and in many other fields of disease

control. The 30th anniversary of the Alma-Ata Declaration renewed the call for primary care development. The WHO has also been effective in its technical services, epidemiology functions, statistics, standardized nomenclatures for disease and drugs, and publications. It has established good working relations with major donors and others in GAVI and in parallel efforts in a wide variety of fields (Box 16.3). The lack of progress in important issues such as women's health and maternal mortality in many large-population countries is primarily due to insufficient national political commitment.

The organizational structure of the WHO includes headquarters in Geneva and seven regional offices, including Europe (EURO-Copenhagen), the Eastern Mediterranean (EMRO-Alexandria), Africa (AFRO-Brazzaville), South-East Asia (SEARO-Delhi), western Pacific (WPRO-Manila), and the western hemisphere [the Pan American Health Organization (PAHO) in Washington, DC]. The central headquarters in Geneva has many offices dealing with a diversity of topics (Table 16.13).

The WHO has led in the formulation of a worldwide consensus on a new direction in health policy. It formulated a strategy that incorporated the principles of governments' responsibility for the health of their peoples, the right of people to take part in developing and controlling their health care, and equality in health. It helped to formulate and promote the concept that cooperative activity among different parts of the public and private sectors (intersectoral cooperation) is necessary to advance health causes. The concept of appropriate technology is also a WHO initiative (see Chapter 15).

The problems and limitations of the WHO are important to assess. The organization is part of the UN system and is governed by its membership countries. It cannot avoid being influenced by political conflicts such as during the Cold War period, regional wars such as in the Middle East, and genocides such as in Darfur. This politicization can be a detriment to its leadership and moral authority. It can also limit contacts of the WHO with the highest quality of professional leadership, impairing its ability to relate to the forefront of medical science, epidemiology, and public health practice. It has also led to inadequate leadership in areas where the response of the WHO to important issues may offend national pride.

The global struggle against tobacco as a major contributor to the spread of chronic diseases is being led by the WHO and regional and national bodies as well as non-governmental organizations (NGOs). Progress in many fields of health, as outlined in Box 16.3, has been a major contribution by the WHO and shows its important role in global health and the world community. Although hampered by its political nature, it exists as an international body in health representing all countries and dealing with health in a broad definition. The WHO's leadership in the Declaration of

TABLE 16.13 National and International Strategies for Coping with Emerging Infectious Diseases

Goal/Topic	Activities	Examples
Surveillance	Detect, promptly investigate, and monitor emerging pathogens, the diseases they cause, and the factors influencing their emergence	Monitoring in sentinel surveillance networks (e.g., blood banks, emergency departments, laboratories, sentinel settings) Population-based surveillance Increase field investigation of outbreaks Dissemination of epidemiological data locally and internationally using electronic media; Internet, websites, ProMED, MMWR, Eurosurveillance, and others Rapid laboratory diagnosis; Monitor vectorborne diseases
Applied research	Integrate laboratory science and epidemiology to optimize public health practices	Promote reporting by sentinel laboratories and clinical settings Improve laboratory diagnostic techniques, genotyping, subtyping, and mapping “fingerprinting” (e.g., <i>Escherichia coli</i> , cholera, poliomyelitis, measles, meningitis)
Prevention and control	Safe animal husbandry; vector control; safe water and sanitation; food control; immunization, rapid diagnosis, directly managed treatment (DOTS); preventive treatment for tropical diseases; promote cooperation between public health, clinical services, veterinary services and IT monitoring of infectious diseases and preventive activities, e.g., immunization	Enhance communication of public health information about emerging diseases and ensure rapid implementation of preventable strategies. Wide and immediate dissemination of health information on infectious diseases to health professionals, general public, groups at special risk Promote health education on prevention of spread of communicable diseases
Infrastructure	Strengthen local, state, and federal public health infrastructures to support surveillance and implement prevention and control programs	Improve laboratories, reporting, and training
International cooperation	Strengthen international effort and funding to promote immunization, nutrition interventions, maternal and child health	WHO, UNICEF, UNDP, WB, FAO, GAVI, Médecins sans Frontières, bilateral aid programs Rotary International, Gates Foundation, and many others working side by side and in growing cooperation to help national governments achieve MDGs
International Health Regulations (IHR 2005)	Approved by WHO and in effect in 2007, ratified by most countries	Legal obligations to report infectious or other public health emergencies (chemical, radiation) of international public health significance. All countries agreed to increase surveillance capacity for emergencies such as SARS or human influenza

Note: DOTS=directly observed treatment, short-course; IT=information technology; ProMED=Program for Monitoring Emerging Diseases; WHO=World Health Organization; UNICEF=United Nations Children’s Fund; UNDP=United Nations Development Programme; WB=World Bank; FAO=Food and Agriculture Organization; GAVI=Global Alliance for Vaccines and Immunization; SARS=severe acute respiratory syndrome.

Sources: Modified from Centers for Disease Control and Prevention. Addressing emerging infectious disease threats. Atlanta, GA: US Public Health Service; 1994. National Institutes of Health. Understanding emerging and re-emerging infectious diseases, 2007. Available at: <http://www.ncbi.nlm.nih.gov/books/NBK20370/> [Accessed 2 June 2013].

World Health Organization. International health regulations. 2005. Available at: <http://www.who.int/features/qa/39/en/index.html> [Accessed 17 January 2008]. National Institute of Allergy and Infectious Diseases. Emerging and re-emerging infectious diseases. Available at: <http://www.niaid.nih.gov/topics/emerging/Pages/Default.aspx> [Accessed 2 June 2013].

Alma-Ata and Health for All 2000 represented an important step forward in international health with its major commitment to primary health care (see Chapter 2).

Tropical disease work on malaria, bilharzia, filariasis, TB, onchocerciasis, leishmaniasis, schistosomiasis, helminthic diseases, and diarrheal disease control is of particular importance to the developing countries. The WHO’s leadership in the eradication of smallpox and virtual eradication of guinea worm disease, onchocerciasis, and polio has made outstanding contributions to improved global health. Its

initiatives in reducing nutritional deficiency conditions, in chronic disease control, in defining health personnel needs, and in health services financing have also been important for both the developing and developed countries.

The WHO develops programs of work that guide its activities and its regional offices as well as member states. The WHO has defined 15 objectives and a number of targets for each objective. These involve a global strategy for health, including promotion of food production and distribution, social progress in literacy, poverty reduction,

and economic growth. Also included are the following: intersectoral cooperation; development of health care systems with a stress on primary care and improved management skills and efficiency; community involvement; improved levels of health resources, including financial support by governments and universities involved in training health personnel; research, technology, and cooperation between countries; and environmental sanitation. All were included as areas for action within this program. WHO's policy framework stresses work with member governments, international organizations, banks, NGOs, and other organizations related to health, economic, and social development.

Many other UN agencies and other organizations play important roles in international health. These include UNICEF, the United Nations High Commissioner for Refugees (UNHCR), the United Nations Development Programme (UNDP), the International Labour Organization (ILO), the FAO, and the International Atomic Energy Commission (IAEC).

UNITED NATIONS CHILDREN'S FUND

Following World War II, the new UN General Assembly created the United Nations International Children's Emergency Fund (UNICEF, now the United Nations Children's Fund), principally to assist the children of war-torn Europe. The program gradually expanded to include other activities and other areas, particularly in developing countries.

This agency has spent large sums of money, especially on food and supplies, for the promotion of child and maternal health and welfare activities throughout the world. Beyond this, usually through partnership with the WHO, UNICEF has been carrying out large and significant programs of bacille Calmette–Guérin (BCG) vaccination and yaws and malaria control. The promotion of family planning in developing countries is one of its major activities. UNICEF plays an important leadership role in fostering primary care and community preventive approaches worldwide.

UNICEF's annual State of the World's Children reports provide thorough reviews of essential topics and valuable data presentations of key health indicators for all countries. UNICEF has been crucial in developing and promoting the UN Convention on the Rights of Persons with Disabilities (CRPD) and the Convention on the Rights of the Child (CRC). As of 2013, 127 countries and the EU have ratified the CRPD with commitments to promote full equality and participation of people with disabilities in society, and 76 countries have signed the CRC.

These conventions set new standards for integrating children with handicaps into general society and call for an end to separating children with disabilities from their families. Children have the right to be cared for by their

parents unless this is deemed by a competent authority to be incompatible with the individual child's best interests. Making "public services, schools and health systems accessible and responsive to the needs of children with disabilities and their families" will reduce the pressure to send children to institutional care at all (UNICEF, State of the World's Children, 2013).

NON-GOVERNMENTAL ORGANIZATIONS

Numerous NGOs carry out specialized activities worldwide. They vary widely in content, funding, ideology, and modus operandi. Many provide important support for developing countries, often succeeding where international agencies have failed, precisely because they work outside the national political framework. This is particularly true in the case of emergencies and areas of conflict.

The earliest NGOs were those of the various church missions and sectarian organizations. Among the many that might be mentioned are the Unitarian Services Committee, the American Friends Services Committee, Catholic Relief Services, the American Jewish Joint Distribution Committee, the International Rotary Club, and the American Bureau for Medical Aid to China. The International Committee of the Red Cross (ICRC), Médecins sans Frontières (MSF), Terres des Hommes, and other European-based NGOs provide direct assistance in developing countries during crises. In 1999, MSF was awarded the Nobel Peace Prize in recognition of its worldwide health achievements.

Philanthropic foundations have made and continue to make major contributions to international health. Private foundations such as the Ford, Soros, and Rockefeller Foundations carry out important international health work within their own exclusive structures. They are important sources of grants to promote pilot programs and research in health care systems. In addition, they contribute extra governmental funding that can stimulate the development of innovative programs later affecting general health services. From its inception in 1999 to late 2007, the Gates Foundation donated some US\$8.5 billion to the international child vaccination program, aid to small farmers, and other health and education programs, mainly in Africa.

Among the foundations, the Rockefeller Foundation is the best known in the field of international assistance in health. Since its inception in 1913, it has operated in almost every country worldwide. Its many significant contributions include support of control programs for malaria and yellow fever, the development of recognized centers of learning in medicine and public health, postgraduate fellowships, and the demonstration of sound methods of organization and operation of health programs.

Despite the many positive aspects of NGOs, they can be a source of distortion in health care services in both developed and developing countries. They tend to focus on one kind of service, are very proud of their independence from government, and can create pressure for services that will place a burden on the system of financing or provision of health care. NGOs or bilateral aid can promote hospital development in places where there is already an oversupply and limited primary care. They can provide a primary service but be unwilling to coordinate with the basic governmental program in immunization, so that no one agency is fully responsible.

Coordination of NGO services into a comprehensive population-based service program may be compromised by political and international sensibilities, which can create chaos in an emergency situation. The balance of services for a population requires inclusion of governmental, NGOs, and private services as a coordinated if not integrated whole. This may be impossible with highly independent NGOs, but the state public health authorities are responsible for overseeing the functions of NGOs, no matter how well meaning or charitable the cause.

THE WORLD BANK

The International Bank for Reconstruction and Development (IBRD), also known as the World Bank, is based in

BOX 16.4 World Development Report: Investing in Health

The World Bank published the World Development Report in 1993. It was ground breaking in stating that good health is essential for human well-being and for national economies. It provided evidence that good health is an economic asset to a nation and that investment in health is a sound economic decision for governments. Health improvement contributes to economic growth by reducing worker absence due to illness; it allows economic development in areas previously too unhealthy for productive work. Good health helps children to attend and learn at school, and good health reduces the costs of health care for treating illness.

This document had a major influence on economists who previously had seen investment in health as a net economic drain on society. This report indicated the opposite. Investment in health contributes to economic growth and societal well-being. The report is widely quoted in current literature on economics of health and is a vital issue in discussions with ministries of finance, which are often staffed by market economics-oriented staff who fail to appreciate the positive contribution that health investment makes to economic growth.

Source: World Bank. *World Development Report, 1993*. Available at: http://wdronline.worldbank.org/worldbank/a/c.html/world_development_report_1993/abstract/WB.0-1952-0890-0.abstract1 [Accessed 25 July 2013].

Washington, DC. It was established by the industrialized countries following the Bretton Woods Conference towards the end of World War II. It was an important financial institution to facilitate the reconstruction of postwar Europe. It has since become a major source of financing for development projects throughout the world. Traditionally, it focused on large-scale infrastructure, industrial, and farming development projects. Its policies in health development focused on promoting market mechanisms and privatization of health care in countries lacking infrastructure. This strategy fostered an inappropriate stress on medical and hospital care when a community health orientation was needed.

The World Bank examined the health sector and its importance for economic development and produced a new assessment of good health as an economic value contributing to economic growth. This assessment led to a growing emphasis on health in global and national economic planning. The 1993 World Development Report: Investing in Health was a landmark document in the development of global health. It examined the interaction of health status, health policy, and economic development, and stated that, contrary to the views held by many traditional economists, health is essential for economic growth, and not a burden on the economy (Box 16.4). The report advocated a four-pronged approach by governments to improve health in developing and former Soviet countries:

- Foster an economic environment that will enable households to improve their own health by promoting income gains for the poor and expanding social investment in raising standards of education, especially for girls.
- Redirect government spending away from specialized care towards low-cost and highly effective activities such as immunization, programs to combat micronutrient deficiencies, and the control and treatment of infectious diseases.
- Encourage greater diversity and competition in the provision of health services by decentralizing government services and promoting competitive procurement practices.
- Foster greater involvement of NGOs and private organizations, and regulate insurance markets.

World Bank assistance to health-related projects is growing steadily. The World Bank and the WHO have worked together on projects such as a special Program for Research and Training in Tropical Diseases and the Onchocerciasis Control Project in West Africa. Long-standing World Bank pro-privatization policies and practices, most notably structural adjustment programs, have led to reduced social welfare infrastructure of developing countries in areas such as housing, education, health services, subsidies, and family transfers. While the World Bank recognizes the importance of health to development, its advocacy of privatization of health services has exacerbated poor health outcomes by reducing access to health services for those unable to pay for care.

The promotion of privatization mirrored the global trend towards more market-oriented economic policies. The World Bank promoted privatization and health insurance to replace direct provision of services by the state. This created problems in many developing countries, where most citizens earn less than US\$2 a day, and private sector services limited access to care of acceptable quality at affordable prices. World Bank policies in health have also obligated many countries to large repayment loans for programs of questionable value while basic services such as adding more successful vaccines to immunization programs are delayed, so that many countries lag behind in the adoption of internationally proven vaccines.

TRENDS IN GLOBAL HEALTH

It is now widely understood that the socioeconomic environment is a basic determinant of the state of health of an individual or a population, even though the precise nature of intervening variables may not be sufficiently elucidated. The southern hemisphere has witnessed, along with its demographic explosion, the persistence of chronic problems plaguing the education, food, and housing sectors. In addition, more acute situations have emerged over the past few decades in relation to conflict, employment, migration, trade, and degradation of the physical environment. The northern hemisphere has enjoyed a rising level of affluence, with negative aspects that have made a sizable impact on public health: overeating, overdrinking, smoking, pollution, illicit drugs, and motor vehicle accidents.

Global changes in the twenty-first century hold the promise of improvements in diagnostic and therapeutic measures, such as targeting drug therapy with nanotechnology, improved diagnostic methods including long-distance imaging methods, and less invasive diagnostic measures. Climate change and the potential for spread of vectorborne diseases, and food supplies and the issues related to genetically modified foods are all issues of huge importance for public health in the coming decades.

Progress in control of vaccine-preventable diseases has been one of the most important public health achievements with eradication of smallpox, closing in on polio eradication, and increasingly effective control of measles since adoption of the two-dose policy. The development and increasingly wide use of vaccines with combinations such as measles–mumps–rubella (MMR), hepatitis B, Hib, rotavirus, varicella, pneumococcal pneumonia, and influenza vaccine is one of the vital issues for achieving the MDG of reducing child mortality. Coverage has improved globally, but expanding the content of child and adult immunization has been painfully slow, despite aid from GAVI and other international donors.

The WHO reports that the maternal mortality ratio in 2010 in developing regions, with 240 maternal deaths per

100,000 live births, is in stark contrast to the average rate of 16 in developed regions and 32 in the countries of the CIS. The drop in the global maternal mortality ratio reflects mainly the reduction that occurred including in countries with high levels of maternal mortality. Countries with the highest initial levels of mortality have made virtually no progress over the past 20 years. While gains are being made in developing and middle-income countries, the annual decline between 1990 and 2010 in both the sub-Saharan Africa and Latin America and Caribbean Regions was only 2.6 percent, and in Eastern Asia excluding China the annual decline was 0.8 percent. The North Africa Region achieved an annual 5.7 percent decline, exceeding the targeted 5.5 percent annual decline. During the same period, annual percentage declines for Southern Asia, South-Eastern and Western Asia were 4.4, 4.9, and 4.2 percent, respectively (Table 16.14). Overall, 51 countries are “making progress”, while 14 countries have made “insufficient progress”, and 11 are characterized as having made “no progress” and are likely to miss the MDG target. This MDG will remain an important health target in the post-2015 period.

The concept of primary health care as the basis of health system development has been almost universally accepted, yet evidence of public commitment to its implementation is still lacking. Problems reported include poor distribution of resources and inadequate orientation of health workers to primary health care, with continuing emphasis primarily on curative services. The community is often insufficiently

TABLE 16.14 Maternal Mortality Ratio, World Millennium Development Goal Regions, 1990–2010

Region	1990	2010	% Change
World	400	210	–47
Developed regions	26	16	–39
Developing regions	440	240	–46
North Africa	230	78	–66
Sub-Saharan Africa	850	500	–41
East Asia	120	37	–69
South Asia	590	220	–63
South-East Asia	410	150	–63
West Asia	170	71	–58
Caucasus and Central Asia	71	46	–35
Latin America and Caribbean	140	80	–43
Oceania	320	200	–38

Source: World Health Organization. Trends in maternal mortality: 1990 to 2010. Table 3. WHO, UNICEF, UNFPA and The World Bank estimates. Comparison of 1990 and 2010 maternal mortality ratio (MMR, maternal deaths per 100 000 live births) and number of maternal deaths, by United Nations Millennium Development Goal region. Available at: http://whqlibdoc.who.int/publications/2012/9789241503631_eng.pdf

aware of the role it should play and is frequently willing to accept competing demands for expensive secondary and tertiary care. A lack of resources to develop preventive services and health promotion is likely to erode the confidence and commitment of health workers and the community to primary health care.

The formulation and analysis of health personnel policy have emerged as growing concerns in the world (see Chapter 14). There is a consensus regarding the urgent need to ensure the relevance and quality of human resources to the requirements of the health system, and to avoid imbalances in the production of health professionals, especially with regard to physicians, nurses, and dentists. In most developing countries, health personnel development plans either do not exist or are in the process of being developed.

International organizations, such as the WHO, UNICEF, UNDP, and OECD, use their wealth of information on a broad range of topics to help governments to foster prosperity and fight poverty through economic growth and financial stability. The OECD helps to reinforce the work of the health-oriented organizations to promote the priority of health as an essential investment for economic development.

While there are rising expectations for better health for all, global changes also constitute challenges to continued progress in health. Population growth, aging of the population, increasing incidence of chronic diseases, high expectations of the public for health care, increasing costs and medical technology, economic recession, and limited resources for health have all contributed pressures for health system reforms to maintain universal coverage. During the latter part of the twentieth century, many industrialized countries developed health reforms that included reduction in hospital bed supply, financial incentives to promote development of community-based services, and a combination of decentralized management and integration of services in those countries with national health services (e.g., the UK). Control of oversupply and excess utilization of hospital beds is also a feature of reforms for cost containment. In the USA, rapidly rising costs led to the expansion of managed care systems seeking cost-effective health care combined with health promotion to reduce disease prevalence and dependency on treatment services (see Chapters 13 and 14).

The relationship between disease and society is such that many of the factors needed to reduce preventable diseases largely lie outside the biomedical framework of genetics, medical care, public health, and health promotion, but are determined by social preconditions that are in the realm of human rights. This, however, does not absolve governments or the health community from the imperative of applying known measures of prevention and curative services for all as a basic human right.

EMERGING INFECTIOUS DISEASE THREATS

International health began as an activity to prevent the spread of epidemics and communicable diseases. This involved the collection and dissemination of information in a timely fashion, preventive measures such as appropriate immunization campaigns to control the spread of a disease, and subsequent follow-up. Success in the eradication of smallpox and increasing control of the vaccine-preventable diseases led to enthusiastic assessments that epidemic diseases were under control. This optimism has been tempered by setbacks in malaria and TB control, along with a host of other emerging and re-emerging disease issues. The experience of SARS and the threat of a potential pandemic of avian influenza indicate a new scale of public health threat and the need for global preparation (see Chapter 4).

The globalization of food and medical products marketing has become an enormous worldwide phenomenon. This has been accompanied by the emergence and dissemination of new infections in human populations, with geographic spread of disease such as HIV, hepatitis C via blood products, and variant Creutzfeldt–Jakob disease (vCJD). Marketing and growth of global demand for beef and animal feed and for human anticoagulant factors for medical treatment contributed to the transmission of HIV, hepatitis C, and vCJD during the decade prior to the detection of these diseases in humans. The incubation period of bovine spongiform encephalopathy (BSE or mad cow disease) is in the order of years. Consumption of beef was declining in the 1980s in keeping with changing lifestyles. Changes in processing may have permitted prions to cross the species barrier from ruminant to human. Slaughterhouse practices in the UK in the 1990s were ineffective in deactivating prions, so that vCJD appeared and mad cow disease reappears periodically, requiring large-scale culling of cattle.

Commercial production of blood factors developed in the USA grew from approximately US\$50 million in 1975 to US\$325 million in 1988. During this period, it was estimated that half of the hemophiliacs in the USA were infected with HIV through this route, and an untold number of hemophiliacs were infected worldwide. In some countries, such as Japan, this was probably the primary route of transmission into the population. By the end of the 1990s, there were 400 commercial centers for plasmapheresis operating in the USA. These centers, which employ paid donors, provided 60 percent of the worldwide requirement for plasma.

By mid-1982 the possible link between AIDS and the blood supply was reported and became widely known and accepted even though AIDS was seen as primarily a sexually transmitted disease of gay men. In the following year the occurrence of cases in hemophiliacs living in geographically dispersed areas led to epidemiological investigations which identified contaminated blood as the source

of infection. The blood factor industry used pooled serum largely from paid donors who were often from groups with high exposure to HIV, such as homosexual men. Self-exclusion was relied on for screening because of fear of potential lawsuits for discrimination by excluding high-risk donors, and the voluntary sector failed to stop blood collection in high-risk areas.

Viral inactivation methods had been under development since the early 1970s to reduce hepatitis transmission in blood. However, the industry leaders considered such steps proprietary information, so the work towards successful strategies was not shared across the corporate competitors. In 1984 the major producers had all been licensed to distribute heat-treated products to reduce the threat of hepatitis and HIV infection, but recall orders were not issued by the US Food and Drug Administration as soon as the risk of HIV transmission in blood factors became known in March 1983, a failure later criticized by the US Institute of Medicine.

By 1985, enzyme-linked immunosorbent assay (ELISA) screening tests for HIV and hepatitis C had come into use. This, coupled with heat treatment of the factor product, markedly reduced the risk of HIV transmission in blood. However, global spread of the virus, in part facilitated by the global trade in factor VIII, had already occurred in the 1980s, affecting the majority of Japanese hemophiliacs and AIDS-affected people during 1983–1985 by non-heat-treated factor concentrates imported from the USA, according to the World Federation of Hemophilia. Worldwide sales of manufactured blood factor products contaminated with HIV and HCV resulted in mass infections and deaths of thousands of hemophiliacs worldwide.

Continued sale of contaminated blood products to hemophiliacs in the mid-1980s led to legal action against French officials of the national blood bank and the ministry of health. Their trial, initially for “poisoning”, resulted in convictions and jail terms for three including a former minister for their role in HIV transmission to some 4000 hemophiliacs in France. In Japan in 2000, three former drug company executives were convicted of selling blood products tainted with HIV and given prison terms.

The spectrum of infectious disease in a community evolves rapidly with changing conditions of the environment and society. Population growth, crowding in urban slums, homeless populations, massive migration, and travel contribute to the transmission of once-localized diseases internationally. Resistance to available antimicrobial medications is creating a new dilemma for modern medicine and public health. The synergism of infectious diseases such as AIDS with TB or *Cryptosporidium* causes deterioration in the patient and spread by secondary infection to other people. The “post-antibiotic era” is widely discussed as a serious threat to modern public health. New research and strategies are required to prevent the loss of some of the

important gains of the twentieth century in communicable disease control. Among the lessons learned from AIDS are that improvements in early warning systems and attention to new threats are vital tasks of public health.

In the USA, several new or resurgent infectious diseases are of increasing public health concern. These include HIV/AIDS, *E. coli* O157:H7 disease, cryptosporidiosis, coccidioidomycosis, multidrug-resistant pneumococcal disease, MDR-TB, vancomycin-resistant enterococci, influenza A Beijing/32/92, hantavirus infections, leishmaniasis in veterans of the 1991 Gulf War, legionnaires’ disease, and Lyme disease.

Newly emerging and re-emerging diseases of concern internationally include HIV/AIDS, multidrug-resistant malaria, TB, cholera, *Shigella dysenteriae*, diphtheria, and *E. coli* O157:H7. Tropical diseases, such as yellow fever and dengue, are reappearing in Asia and Latin America, and Rift Valley fever in Egypt, Saudi Arabia, and Yemen; Lassa fever in West Africa; Ebola virus in the Democratic Republic of the Congo (formerly Zaire); Marburg virus via imported monkeys; Oropouche arbovirus and Sabia in Brazil; Junin virus in Argentina; and Machupo virus in Bolivia all are health concerns as they may spread from their natural habitat to other countries before the carrier shows symptoms.

West Nile fever spread from the Middle East to New York City and then to other parts of the USA in 1999, with 62 severe cases and seven deaths, but spread farther in 2000 and 2001, followed by a dramatic increase in 2002 with over 4000 human cases in North America and Europe. The disease has become endemic in mosquito populations and the cause of hundreds of deaths annually in the USA alone. The spread of new diseases was dramatically demonstrated during the SARS episode of 2003 and with avian influenza since 2005 (see Chapter 4). In 2007, chikungunya fever spread from South-East Asia to Italy and southern France, where it has become endemic.

It can no longer be assumed that such diseases will remain in their natural habitats; they can be transmitted all over the world via human or animal carriers and, in appropriate conditions, become serious local or even general public health concerns. The 1995 outbreak of Ebola virus in the former Zaire raised international concern of the very real possibility of widespread transmission of this deadly disease (Box 16.5). The public has been made aware of this kind of situation in graphic detail in the news media, novels, and movies. Again, the threat of avian influenza remains a looming public health disaster of global proportions.

In 1996, a large-scale epidemic of food poisoning in Japan involving *E. coli* O157:H7 (first described in 1982) spread through contaminated school lunches and caused over 3000 illnesses, hundreds of hospitalizations for bloody diarrhea, many with severe hemolytic uremic syndrome, and seven deaths. The identification of the source proved to

BOX 16.5 Ebola Virus

Ebola virus is named after a river in the Democratic of the Congo (DRC, formerly Zaire), where it was first recognized in 1976. It is a member of the family of ribonucleic acid (RNA) viruses called the Filoviridae with identified subtypes including Ebola-Zaire, Ebola-Sudan, and Ebola-Ivory Coast. It is the cause of a deadly hemorrhagic fever, with high mortality. An outbreak of Ebola virus in Zaire in 1995 was of major international concern, because of its 77 percent mortality rate and a fear that it could spread rapidly. This outbreak in Kikwit was limited to a total of 315 cases with 250 deaths (81 percent) were identified, many of whom were hospital workers. The organism has been isolated in specific species of monkeys and can be transmitted to humans via blood and secretions.

An international team mobilized by the World Health Organization (WHO) and Centers for Disease Control and Prevention (CDC) went to the site to assist the DRC public health staff. Stress on case detection, laboratory confirmation, isolation, and staff protection helped to limit the disease spread. The WHO Collaborating Center on Arboviruses and the Viral Hemorrhagic Fevers reference laboratory at the CDC in Atlanta, USA, played an important part in management of this epidemic. Rapid international response and heightened surveillance are part of the global concern for newly emerging infectious diseases, partly resulting from the lessons learned from the slow response to the AIDS epidemic. Outbreaks occurred in South Sudan in 2004, and in DRC in 2007.

More recent outbreaks occurred in DRC in 2008, with 32 cases and 15 deaths (47 percent), and in Uganda in 2011 with a single case who died. In 2013, evidence of Ebola virus in fruit bats in Bangladesh suggested a possible reservoir and source of infection of humans.

Sources: World Health Organization. *World Health Report, 1996*. Geneva: WHO.

Centers for Disease Control and Prevention. *Questions and answers about Ebola hemorrhagic fever*. CDC; 2005. Available at: <http://www.cdc.gov/ncidod/dvrd/Spb/mnpages/dispages/ebola/qa.htm>

World Health Organization. *Ebola hemorrhagic fever*. WHO; 2007. Available at: <http://www.who.int/csr/disease/ebola/en/>

World Health Organization. *Ebola haemorrhagic fever*. WHO; 2012. <http://www.who.int/mediacentre/factsheets/fs103/en/index.html>

Centers for Disease Control and Prevention, Special Pathogens Branch. *Known cases and outbreaks of Ebola hemorrhagic fever in chronological order*. Available at: <http://www.cdc.gov/ncidod/dvrd/spb/mnpages/dispages/ebola/ebolatable.htm> [Accessed 2 June 2013].

Olival KJ, Islam A, Yu M, Anthony SJ, Epstein JH, Khan SA, et al. *Ebola virus antibodies in fruit bats, Bangladesh*. *Emerg Infect Dis* 2013;19(2). Available at: <http://dx.doi.org/10.3201/eid1902.120524> [Accessed 30 May 2013].

be very difficult. Milder epidemics have occurred in many other countries, including Australia, Canada, the USA, and various European countries, so that there is continued concern for recurrence of this potentially severe form of food poisoning. The ProMED website monitors infectious diseases globally, with email reports on virtually a daily basis. Other web-based infectious disease monitoring and information-sharing systems are invaluable public health

teaching and service programs that are available via the CDC website.

Food safety monitoring is vital in the control of food-borne disease outbreaks in both domestic and international trade. The WHO established the Global Public Health Intelligence Network (GPHIN), a web-based system that monitors news reports of infectious disease outbreaks around the world; Salm-Surv, a global network linking laboratories tracking the incidence of *Salmonella* and other food-borne diseases; the Global Outbreak Alert and Response Network (GOARN), which provides technical assistance within 24 hours to governments facing potential epidemics; and the International Food Safety Authorities Network (INFOSAN), which enables transborder collaboration and assistance among food safety officials. These systems supplement individual national surveillance and diagnostic functions.

In 2005, the WHO adopted new International Health Regulations (IHR), which have been adopted by most countries and came into effect in June 2007. The IHR address all diseases and health events that may constitute a public health emergency of international concern, to contain the threat of international spread of diseases such as SARS, or a new human influenza virus. The IHR includes threats of public health emergencies that may spread across borders, such as chemical spills, leaks, and dumping, or nuclear meltdowns. They replace the previous IHR (1969) which addressed only four diseases: cholera, plague, yellow fever, and smallpox, since then eradicated. The repealed IHR focused on the control at borders and relatively passive notification and control measures. The new IHR provides a legal basis for global disease surveillance, alert, and response. It defines the rights, obligations, and procedures in ensuring international health security without unnecessary interference in international traffic and trade. It requires all member states to strengthen their existing capacity for disease surveillance and response.

International standards of food, plant, and animal safety are addressed in the *Codex Alimentarius* ("Food Law") Commission (WHO and FAO), the International Plant Protection Commission (IPPC), and the Organization for Animal Health (Office International des Épizooties, or OIE). The World Trade Organization (WTO) works to break down – not erect – trade barriers; world exports of agricultural products increased by 21 percent in 2011 to US\$1659 billion.

While the health and safety measures provided by the WHO and WTO are considerable, they are limited by the respective organizations' resources and priorities. Global trade in agricultural products in 2002 was US\$583 billion, rising to US\$1660 billion in 2011. Food scientists work in both industry and academic centers to discover new products, ensure quality assurance of specific products, and provide standards for the production, processing, marketing,

and distribution of foods, with improved nutritional value and safety.

International cooperation to identify new infectious or other health threats to prevent global epidemics is an urgent priority for both international agencies and national health systems throughout the world. Control of communicable diseases requires medical, laboratory, and epidemiological intelligence services of a high order, with rapid means of communication, publication, and coordination, backed up by skilled professional services. Examples of international activity in the control of infectious disease are numerous (Box 16.6). The crowning achievement in this field was the eradication of smallpox. This great feat may soon be matched by the international eradication of polio. Such achievements can only be made with major efforts in international commitment and cooperation, working with international and national agencies, donor organizations, and ultimately with the people themselves.

Governmental agricultural policies have important impacts on health. Therefore, food safety monitoring remains an ongoing problem for the international agricultural and public health authorities, especially as market-driven agricultural forces become an increasingly important part of world trade, with growing populations and increasing economic power in rapidly developing economies. Traditionally, governmental subsidies on the production of meat, dairy products, and sugar have led to their increased consumption. At the same time, such subsidies penalize fruit and vegetable production and consumption to the health detriment of populations owing to their cost or limited supply. This adversely affects vulnerable groups in the population both within countries and globally. High intakes of fat and sugar with low consumption of fruits and vegetables are associated with obesity, hypertension, stroke, and early coronary heart disease. Domestic and international policies to reduce beef and other saturated fat consumption while increasing fruit and vegetable consumption are vital to a

BOX 16.6 The Global Alliance for Vaccines and Immunization (GAVI): An Innovative Partnership

The Global Alliance for Vaccines and Immunization (GAVI) was established in 2000 at the World Economic Forum at Davos as an alliance of different stakeholders from the private and public sectors, with the mission of saving children's lives through the worldwide expansion of mass vaccination programs. GAVI's partners include 16 donor countries, United Nations agencies and institutions (UNICEF, WHO, the World Bank), civil society organizations (International Pediatric Association), public health institutes (Johns Hopkins Bloomberg School of Public Health), donor and implementing country governments, the Bill & Melinda Gates Foundation, other private philanthropists, vaccine industry representatives, the financial community, and others whose collective efforts and expertise are enabling great progress to be made in this field.

The GAVI Alliance is a unique, multidimensional partnership of public and private sector resources with a shared focus: to improve child health in the poorest countries by extending the reach and quality of immunization coverage within strengthened health services.

These efforts are directed through the financing mechanisms of the GAVI Fund and the work of the Geneva-based GAVI Secretariat, which channels funding, optimizes product availability and market pricing, and coordinates the field support necessary to plan and implement programs in the world's poorest countries.

Funding is time limited. The intent is to enable countries to develop sustainable programs and progress towards integrating them into national health budgets. The sustainability of these gains depends on national governments placing financial and political priority on these programs and adopting them into their regular budget or financing systems. More than 40 countries now have multiyear immunization plans in keeping with GAVI objectives.

GAVI's efforts are vital to achieving the Millennium Development Goal on child health, which calls for reducing childhood mortality by two-thirds by 2015. By the end of 2010, GAVI had supported the full immunisation of 296 million additional children in 77 countries. Under-five mortality rate in GAVI-supported countries declined from 78 in 2010 to 73 per 1,000 live births in 2012, helping to achievement of the MDG target of 68 in 2015.

Introducing pentavalent vaccine (DPT, Hep B and Hib), rotavirus, pneumococcal pneumonia, and human papillomavirus vaccines to low-income countries was a distant dream a decade ago, but the combination of donors has made near-eradication of poliomyelitis and introduction of new life-saving vaccines possible. GAVI brings modern vaccines to low-income countries, quickening the pace of their introduction and reaching a growing percentage of vulnerable children. The problem of sustainability in times of economic distress is a real one, but economic growth in Africa and Asia has made it possible for national governments to provide increased resources to health and continue to save the lives of children and mothers.

Source: *Global Alliance for Vaccines and Immunization (GAVI): an innovative partnership.* Available at: http://www.gavialliance.org/about/in_partnership/index.php [Accessed 28 May 2013].

GAVI. *Global vaccine action plan 2011-2020 as adopted by the World Health Assembly in 2012.* Available at: http://www.who.int/immunization/global_vaccine_action_plan/GVAP_doc_2011_2020/en/index.html?utm_source=Self-Subscribe&utm_campaign=9a43426e42-WIW_Annual_Report_launch_letter4_22_2013&utm_medium=email (accessed 12.1.14.).

GAVI. *Goal-level indicators updated October 2013.* Available at: <http://www.gavialliance.org/results/goal-level-indicators/> (accessed 12.01.14.).

GAVI. *Global vaccine action plan 2011-2020 as adopted by the World Health Assembly in 2012.* Available at: http://www.unicef.org/videoaudio/PDFs/GVAP_single_pages_PRINT.pdf (accessed 12.1.14.).

healthy nutrition program. This needs to be coupled with the fortification of commonly used foods to address micronutrient deficiencies common in developing and developed countries and as part of larger programs to prevent the rapid spread of CVD, obesity, diabetes, and other chronic conditions.

In 2006–2007, high prices for oil led to a demand for alternative energy sources for motor vehicles with increased use of grains and corn for ethanol fuel production, causing sharp rises in price of wheat, corn, and flour-based food products. Use of foods for energy is seen as inefficient and uneconomic, but the search for non-polluting energy sources will generate major economic growth in new sectors of technology and industry in the decades ahead. These agroeconomic and effective energy policies, along with poverty reduction, educational opportunities, and global and equitable economic growth, are issues of great public health importance internationally.

Despite progress and optimism, the tragic global toll of death and mental or physical disability continues, with preventable infectious or vitamin deficiency conditions numbering in the hundreds of millions. Other issues remain to be dealt with in global health, especially regarding women's health, including family planning, reduction of maternal mortality and morbidity, reduction of violence and abuse against women, and improved education and job opportunities. Child abuse, child labor, female-child murder, and sexual exploitation remain large-scale global health problems. Increasingly, non-infectious conditions affecting young adult and middle-aged males are becoming issues of global health; for example, CVD, diabetes mellitus, trauma, and cancer. Care of special needs groups in the population, such as the mentally ill, the disabled, and the elderly (see Chapters 6 and 7), are global health problems that require attention in each country and locality.

International, individual government and community action is vital to deal with these issues, not only in the poorest countries, but also in developed countries. Known public health measures applied effectively can reduce the burden of these conditions within a very few years. This is a challenge of historical importance and necessity.

EXPANDING NATIONAL HEALTH CAPACITY

The idea of a *cordon sanitaire* to protect a nation's health from invading epidemics is a form of passive defense that has not been effective in major epidemics in the latter part of the twentieth century. A forward defense is now part of the New Public Health. Countries need to reach out to other countries to improve international public health capacity as

their own first line of defense. The tragedy of the late discovery of AIDS and inadequate early response was matched by the equally poor handling of the first phase of the 1991–1996 cholera epidemic in South America. The 1991 epidemic cost Peru some US\$770 million in lost food exports and reduced tourism. Cholera in Haiti, possibly introduced by international UN troops following the earthquake of 2010, infected many thousands of people in the wreckage of sanitation and housing in the aftermath of the earthquake. In 2012 there were 112,076 cases of cholera in Haiti, with 894 deaths (WHO: Cholera 2012).

Building the first line of defense means strengthening the capacity of individual countries to detect, report, and request help in controlling potentially serious disease outbreaks. Help is available from the WHO, the CDC in Atlanta, USA, and newly strengthened counterparts in France and the UK, as well as international organizations such as the International Red Cross, MSF, and many others. Training in basic epidemiology, sterile techniques, and laboratory services can mean the difference between local containment and widespread infection of hemorrhagic fever viruses, with person-to-person transmission amplified in a hospital setting.

Even the industrialized countries are in need of strengthening of epidemiological capacity. Few have adequate information systems to collect hospitalization data that can provide vital measures of morbidity and the economics of health services. Few have the training capacity for public health epidemiologists, economists, sociologists, sexologists, psychologists, or anthropologists, let alone entomologists, geneticists, and the many other professionals making up the New Public Health team.

Many industrialized countries, satisfied with universal access to doctors and hospitals and the feeling that infectious diseases were going away under the power of sanitation, vaccination, and antibiotics, allowed their public health infrastructure to decline with poor pay, reward, recognition, and motivation, and lack of training capacity. The 1990s brought a different reality of emerging and re-emerging infectious diseases and other plagues such as violence and trauma, drugs, heart disease, cancer, and stroke. Failure to prepare public health professionals and support systems is an invitation to disaster, both epidemiologically and economically. No country can afford such laxity. Training of public health professionals requires graduate schools of public health, which are more essential than the excess of medical schools that already exist in most countries.

The 2006 World Health Report (*Working Together for Health*) focused on worldwide shortages of health personnel, especially in the countries with the most severe health problems. The supply of health workers ranges from 2.3 per 1000 population in Africa and 4.3 in South-East Asia to 18.9 and 24.8 in Europe and the Americas, respectively.

BOX 16.7 Achievements of the Millennium Development Goals 2001–2012

Working together, governments, the United Nations family, the private sector, and civil society have succeeded in saving many lives and improving conditions for many more. The world has met some important targets – ahead of the deadline.

- Extreme poverty is falling in every region. For the first time since poverty trends began to be monitored, the number of people living in extreme poverty and poverty rates fell in every developing region – including in sub-Saharan Africa, where rates are highest. The proportion of people living on less than US\$1.25 a day fell from 47 percent in 1990 to 24 percent in 2008 – a reduction from over 2 billion to less than 1.4 billion people.
- The poverty reduction target was met. Preliminary estimates indicate that the global poverty rate at US\$1.25 a day fell in 2010 to less than half the 1990 rate. If these results are confirmed, the first target of the Millennium Development Goals – cutting the extreme poverty rate to half its 1990 level – will have been achieved at the global level well ahead of 2015.
- The target of halving the proportion of people without access to improved sources of water has been met. The target of halving the proportion of people without sustainable access to safe drinking water was also met by 2010, with the proportion of people using an improved water source rising from 76 percent in 1990 to 89 percent in 2010. Between 1990 and 2010, over 2 billion people gained access to improved drinking water sources, such as piped supplies and protected wells.
- Improvements in the lives of 200 million slum dwellers exceeded the target. The share of urban residents in the developing world living in slums declined from 39 percent in 2000 to 33 percent in 2012, improving the lives of at least 100 million slum dwellers, well ahead of the 2020 deadline.
- Parity in primary education between girls and boys has been achieved and many more of the world's children are enrolled in primary school since 2000. Girls have benefited the most. The ratio between the enrolment rate of girls and that of boys grew from 91 in 1999 to 97 in 2010 for all developing regions. The gender parity index value of 97 falls within the plus-or-minus 3-point margin of 100 percent, the accepted measure for parity.
- Enrolment rates of children of primary school age increased markedly in sub-Saharan Africa, from 58 to 76 percent between 1999 and 2010. Many countries in that region succeeded in reducing their relatively high out-of-school rates even as their primary school age populations were growing.
- Child survival is gaining momentum. Despite population growth, the number of under-five deaths worldwide fell from more than 12.0 million in 1990 to 7.6 million in 2010. Progress in the developing world as a whole has accelerated. Sub-Saharan Africa, the region with the highest level of under-five mortality, doubled its average rate of reduction, from 1.2 percent a year over 1990–2000 to 2.4 percent during 2000–2010.
- Access to treatment for people living with HIV increased in all regions. At the end of 2010, 6.5 million people were receiving antiretroviral therapy for HIV or AIDS in developing regions. This total constitutes an increase of over 1.4 million people from 2009, and the largest one-year increase ever. The 2010 target of universal access, however, was not reached.
- Globally, tuberculosis incidence rates have been falling since 2002, and current projections suggest that the 1990 death rate from the disease will be halved by 2015. The world is on track to achieve the target of halting and beginning to reverse the spread of tuberculosis.
- Global malaria deaths have declined. The estimated incidence of malaria has decreased globally, by 17 percent since 2000. Over the same period, malaria-specific mortality rates have decreased by 25 percent. Reported malaria cases fell by more than 50 percent between 2000 and 2010 in 43 of the 99 countries with ongoing malaria transmission.

Note: HIV=human immunodeficiency virus; AIDS=acquired immunodeficiency syndrome.

Source: The Millennium Development Goals Report 2012. Available at: <http://www.un.org/en/development/desa/publications/mdg-report-2012.html> [Accessed 18 February 2013].

Issues relate not only to quantity but also to access, quality, and support systems for health workers. Migration of educated people in the population tends to drain doctors and nurses from poor countries to wealthy countries, exacerbating shortages and the problems of developing and sustaining standards of care (see Chapter 14).

The UN set out eight key targets for improved health education and social development, the MDGs, in 2001. The targets agreed to by 191 nations stimulated international efforts towards the achievement of improved population health, especially for the world's most disadvantaged people. The 2012 review of progress with important results is summarized in [Box 16.7](#).

TOP-DOWN AND BOTTOM-UP DEVELOPMENT

Improved health requires commitment and leadership and funding from the top of government pyramid, while at the same time enabling local communities to act to improve education, sanitation, communication, and health. Exciting developments are taking place on a large scale in countries such as Ethiopia, Rwanda, and Swaziland.

Ethiopia is struggling to improve child health and nutrition. Stunting was reduced from 58 percent in 2000 to 44 percent in 2011, underweight rates decreased from 41 percent in 2000 to 29 percent in 2011, with improved treatment

TABLE 16.15 Ethiopian Health Extension Worker Program Priorities

Hygiene and Environmental Sanitation	Disease Prevention and Control	Family Health Services	Health Education and Communication
Proper and safe excreta disposal system	Prevention and control of HIV/AIDS	Maternal and child health	Health education and communication
Proper and safe solid and liquid waste management	Prevention and control of tuberculosis	Family planning	
Water supply safety measures	Prevention and control of malaria	Immunization	
Food hygiene and safety measures	First aid	Adolescent reproductive health	
Healthy home environment		Nutrition	
Arthropod and rodent control			
Personal hygiene			

Sources: Shimelis. Personal communication; May 2013.

McCord GC, Lio A, Singh P. Deployment of community health workers across rural sub-Saharan Africa: WHO financial considerations and operational assumptions. *Bull World Health Organ* 2012;91:244–53B.

Ethiopian Ministry of Finance and Economic Development and UNDP. Ethiopian MDG report: trends and prospective for meeting MDG by 2015. Addis Ababa, Ethiopia; 2010.

of around 300,000 severely malnourished children treated in eight drought-affected regions in 2011 (84 percent cure rate and 0.6 percent death rate). Although child and maternal mortality are significantly decreasing in Ethiopia, the rates remain the highest among the developing world. The infant mortality rate decreased from 97 per 1000 in 2000, to 77 per 1000 in 2005, and to 59 per 1000 in 2011. The under-five mortality rate was reduced from 166 to 123 then 82 per 1000 live births in these same years.

In 2007, Ethiopia expanded a health extension program (HEP), tested in 2004–2005, with training and deployment of 2800 female health extension workers (HEWs), later increased to 33,819 HEWs (a worker to population ratio of two per 5000 people), reaching 89 percent of health posts in rural subdistricts, and working with 2566 HEP supervisors deployed by the end of 2009. This preventive-oriented CHW model provides universal access to primary care with a community-based health promotion and disease prevention strategy. Some 1 million children and 700,000 pregnant or lactating women receive vitamin A supplementation and deworming tablets every 6 months. Iron–folate supplementation is targeted to reach 80 percent of pregnant women. The nutrition program is being revised to focus on children under 2 years, pregnant and lactating women, and adolescent females as a strategy to break the intergenerational cycle of malnutrition, and incorporates other government agencies and the private sector (Ferew and Matji, 2013). The HEWs are highly accepted by the community and work with volunteer CHWs in the villages to achieve specified goals with modest cost. They carry out a baseline survey of the village using a standardized tool, mapping households and the population by age category. They also prioritize health problems of the village, and set targets with respect to the four major areas and 17 service packages of services as seen in Table 16.15.

BOX 16.8 Lessons from Rwanda: Strategies for Strengthening Comprehensive Health Systems

- *National leadership* – high-level political commitment to equity and to service delivery as well as a clear plan for action.
- *Health systems approach* – harnessing funding for disease-specific or other “vertical” programs to build and strengthen platforms for integrated service delivery.
- *Country ownership* – health system spending managed by or in partnership with national and local government.
- *Community-based care* – for example, using community health workers to increase the effectiveness and efficiency of care delivery, especially for chronic diseases.
- *Evidence-based policy making* – a critical “feedback loop” linking research to service and training to promote accountability and improve the quality of care.
- *Cross-sector collaboration* – strengthening health systems with partnerships between the public and private sectors and also across sectors and ministries.

Source: Farmer PE, Nutt CT, Wagner CM, Sekabaraga C, Nuthulaganti T, Weigel JL, et al. Reduced premature mortality in Rwanda: lessons from success. *BMJ* 2013;346:f65. <http://dx.doi.org/10.1136/bmj.f65>.

The deployment of CHWs has helped to produce sustainable and low-cost interventions for common health problems in the developing countries. Progress in child health in Rwanda has been achieved by a combination of government and donor organization development of community-based preventive and treatment services with improved coverage of a widened range of vaccines, including rotavirus and HPV (Box 16.8). There have been increases in the number of married women using contraception, deliveries in medically supervised facilities, the use of bed nets for malaria control, and HIV treatment.

The results have been seen in major reductions in child and maternal mortality and HIV deaths (Farmer et al., 2013). Similarly, good progress has been made in Ethiopia in implementing CHW systems on a large scale, which have succeeded in improving nutrition and immunization, and reducing female genital mutilation (Ferew and Matji, 2013).

Famer and colleagues suggest applying systems-level analysis to the complex processes and interventions that must occur, across a health care system and over time, to deliver high-value care for patients with HIV/AIDS and co-occurring conditions, from TB to malnutrition. To deliver value, vertical or stand-alone projects must be integrated into a shared delivery infrastructure so that personnel and facilities are used wisely and economies of scale reaped. Two other integrative processes are necessary for delivering and assessing value in global health: one is the alignment of delivery with local context by incorporating knowledge of both barriers to good outcomes (from poor nutrition to a lack of water and sanitation) and broader social and economic determinants of health and well-being (jobs, housing, and physical infrastructure). The second is the use of effective investments in care delivery to promote equitable economic development, especially for those struggling against poverty and high burdens of disease (Kim et al., 2013).

Many CHW programs have demonstrated the effectiveness of this approach in many countries such as Ethiopia, and in a 2003 study in Colorado, USA, in which CHWs' efforts reduced cardiovascular risk factor prevalence in trial communities compared to control groups. These principles apply in Los Angeles, in New Delhi, and most certainly in rural India and sub-Saharan Africa (see Chapter 14). The Human Development Report entitled *The Rise of the South* (UNDP, 2013) indicates rapid economic and social development, with large population groups moving up the "ladder of development" as seen in **Box 16.9**. Health gains are major factors and are integral to economic development.

BOX 16.9 The Rise of the South

Countries in the southern hemisphere are showing remarkably rapid and widespread progress. This is bringing broad human development and "dramatic expansion of individual capabilities and sustained human development progress" in countries with the vast majority of the world's people. Dozens of countries and billions of people are moving up the development ladder, with direct impact on wealth creation and broader human progress in all countries and regions of the world. "This provides new opportunities for catch-up in less developed countries with creative policy initiatives that could benefit the most advanced economies as well."

Source: United Nations Development Programme. Human development report 2013. *The rise of the south: human progress in a diverse world*. New York: UNDP; 2013. Available at: http://hdr.undp.org/en/media/HDR2013_EN_Summary.pdf [Accessed 26 May 2013].

GLOBAL HEALTH AND THE NEW PUBLIC HEALTH

The New Public Health is concerned with globalization of health in several senses. First, it includes all health activities in any one country, and second, what happens in the rest of the world, including the effects of globalization, is of direct interest to each country, no matter how wealthy, industrialized, or isolated. The lessons of the bubonic plague may seem to be remote history to the generation raised on concepts of the success of public health in the control of communicable diseases, but the lessons of HIV should surely be learned. John Donne's famous idea that "no man is an island unto himself" expresses the issue clearly. Global health means identifying and addressing the acute infectious and chronic diseases as early as possible before they spread or amplify by common risk factors.

In the twenty-first century, many developing countries are reaching an epidemiological transition that took place in the industrialized world in the mid-twentieth century. The resurgence of long-known diseases and the emergence of new and sinister infectious disease threats are occurring worldwide. The industrialized countries are again facing serious infectious disease challenges, including those imported from developing countries.

In the 1950s and 1960s, control of infectious diseases looked extremely promising. Vaccines and antibiotics seemed to provide the answer to age-old infectious diseases. But in the 1970s and 1980s new infectious organisms appeared, along with a frightening increase in resistance of microorganisms to therapeutic agents. Diseases spread from country to country, as did HIV in the 1980s, and cholera in Peru and diphtheria in Russia in the 1990s, and the plague outbreak in India in 1994.

The Global Burden of Diseases, Injuries, and Risk Factors Study (GBD 2010), headed by Professor Chris Murray of the Harvard School of Public Health, was a collaboration of 488 scientists from 303 institutions in 50 countries. The study documented the state of health indicators around the world using uniform methods. The burden of each disease, injury, or risk factor was calculated in terms of deaths, years of life lost due to premature mortality (YLLs), years lived with disability (YLDs), and disability-adjusted life years (DALYs). Age-specific mortality was analyzed for each of 187 countries for the years from 1970 to 2010 (Murray et al., 2012). This study provides important data for economic analysis studies such as those carried out by the World Economic Forum and the Harvard School of Public Health (2011) to define the economic burden associated with NCDs. This joint report focuses on low- and middle-income countries, which account for 84 percent of the world's population and 83 percent of the NCD burden. A 2011 WHO report (*Scaling up action against non-communicable diseases: How much will it cost?*), quantifying the expected costs of addressing projected national NCD mortality rates against the current

and future economic output of a country, shows great economic gains with appropriate interventions (Table 16.16).

The chronic diseases associated with the risk factors of overnutrition and smoking are increasing in low- and medium-income countries just as the public health field is gaining momentum in controlling infectious and childhood diseases. In addition, all countries are facing the strains of health expenditures and the painful process of health reform. The legal, ethical, and technological challenges are increasingly important in managing health care systems (Box 16.10).

All health systems are obliged to face these challenges through the sharing of information and improved monitoring of the use of resources, as well as seeking effective ways of preventing diseases and managing them to promote early and complete return to function. All industrialized countries are facing serious problems financing health care in its traditional form, and reform is taking place amid aging of the population, increasing technology, and high expectations of health care. Reforms shifting emphasis and resources from hospital to ambulatory and primary care show a strong return to the idea of health promotion by regulation and education.

Some answers to unconquered infectious diseases have come from simple technology, such as the use of ORT to reduce morbidity and mortality from diarrheal diseases. The resurgence of TB and multidrug-resistant organisms has been successfully handled by another simple innovation of directly observed therapy by CHWs to ensure compliance and completion of treatment, especially in high-risk groups.

Malaria control, using specially trained CHWs, is another application of inexpensive, simple, appropriate technology.

Simpler technologies are also having a major impact on the chronic diseases. Cardiovascular mortality rates are falling in most industrialized countries as a result of healthier lifestyles and improved treatments such as antihypertensive treatments, low-fat diets, statins, aspirin, and physical activity. New screening techniques are being developed continuously. Lung cancer screening using low-dose helical computed tomography as compared to chest radiography among heavy-smoking older adults shows reduced mortality from lung cancer. New diagnostic tests for cancer will include refined robotic smell techniques. New urine tests will help in early detection of bladder cancer and help to continue the reduction in cancer mortality being seen in

BOX 16.10 Costs of Scaling Up a Core Intervention Package for Non-Communicable Diseases in Low- and Middle-Income Countries

The health and economic consequences of non-communicable diseases (NCDs) are staggering. NCDs are the leading causes of death globally and 80 percent occur in low- and middle-income countries. Half of these deaths occur in the productive years of life, affecting economic activity of the countries. In older people NCDs cause disability and health care needs that are costly to economies. In a “business as usual” scenario where intervention efforts remain static and rates of NCDs continue to increase, yearly loss to the economy is equivalent to approximately 4 percent of these countries’ current annual output. On a per-person basis, the annual losses amount to an average of US\$25 in low-income countries, US\$50 in lower middle-income countries and US\$139 in upper middle-income countries.

A World Health Organization study indicates that the price tag for scaled-up implementation of a core set of NCD “best buy” intervention strategies is comparatively low. Population-based measures for reducing tobacco and harmful alcohol use, as well as unhealthy diet and physical inactivity, are estimated to cost US\$2 billion per year for all low- and middle-income countries – less than US\$0.40 per person. Individual-based NCD “best buy” interventions, ranging from counseling and drug therapy for cardiovascular disease to measures to prevent cervical cancer, bring the total annual cost to US\$11.4 billion. On a per-person basis, the annual investment ranges from under US\$1 in low-income countries to US\$3 in upper middle-income countries. Reducing mortality rates for ischemic heart disease and stroke by 10 percent would reduce economic losses in low- and middle-income countries by an estimated US\$25 billion per year, which is three times greater than the investment needed for the measures to achieve these benefits.

Source: World Economic Forum and Harvard School of Public Health. *The global economic burden of non-communicable diseases; 2011.* Available at: <http://www.weforum.org/EconomicsOfNCD> [Accessed 11 June 2013].

TABLE 16.16 Economic Burden of Selected Non-Communicable Diseases: Economic Lost Output 2011–2025, (trillions of US Dollars in 2008)

Country Income Group	Respiratory				Total
	Diabetes	CVDs	Diseases	Cancer	
Upper middle	0.30	2.52	1.09	1.20	5.12
Lower middle	0.91	1.07	0.44	0.26	1.85
Low income	0.02	0.17	0.06	0.06	0.31
Total of low and middle	0.42	3.76	1.59	1.51	7.28

Note: CVD = cardiovascular disease.

Sources: World Health Organization. Burden to “best buys”: reducing the economic impact of non-communicable diseases in low- and middle-income countries. Available at: http://www.who.int/nmh/publications/best_buys_summary.pdf [Accessed 3 June 2013].

World Economic Forum and Harvard School of Public Health. The global economic burden of non-communicable diseases; 2011. Available at: http://www3.weforum.org/docs/WEF_Harvard_HE_GlobalEconomicBurdenNonCommunicableDiseases_2011.pdf [Accessed 29 July 2013].

World Health Organization. Scaling up action against non-communicable diseases: how much will it cost? WHO; 2011. Available at: http://whqlibdoc.who.int/publications/2011/9789241502313_eng.pdf [Accessed 29 July 2013].

TABLE 16.17 Basic Risks and Continuum of Care for Prevention of Child Morbidity and Mortality

Stage	Risks	Prevention/Treatment
Pre-pregnancy	Education, marriage before age 19; poor nutrition, female genital mutilation, HIV, STIs	CHW assessment, counseling, iron and folic acid supplements, teach and monitor hygiene, promote breastfeeding, screen and treat hypertension, renal disease, HIV, STIs
Pregnancy and lactation	Lack of prenatal care, abuse, smoking, alcohol, drugs, lack of adequate diet; anemia; low birth weight, neural tube defect, fetal alcohol syndrome	CHW care; good nutrition, multi-micronutrient supplements including vitamin A, iron, and folic acid; risk assessment, referral if high risk, antenatal care from earliest stage, HIV treatment, counseling
Delivery	Preterm birth, lack of trained midwifery care, poor hygiene, anemia, hemorrhage, eclampsia, infection, hypertension, prolonged and obstructed labor; maternal death; vesicovaginal fistula	Trained attendants, hygienic, safe delivery, referral to medical center/hospital for high-risk patients; telemedicine (cell phone or landline); transportation; family support
Neonatal	Half of neonatal deaths occur in first 24 hours and three-quarters in first week of life; non-breastfeeding, lack of trained care providers, asphyxia, respiratory infection, diarrheal diseases, tetanus, HDN	Appropriate care by trained attendant; Apgar score; initiate and sustain exclusive breastfeeding; HIV care; vitamin K and hepatitis B injections and eye care with antibiotic after birth; oxygen and antibiotic if respiratory distress; ORS for diarrhea; register births and birth weight and complications
Infancy	Inadequate milk formula and feedings, contaminated water and food; worms; malnutrition; lack of stimulus of developmental tasks; infectious diseases – diarrhea, respiratory, malaria; non-breastfeeding with risk of childhood obesity, type 1 and type 2 diabetes, sudden infant death syndrome	Exclusive breastfeeding for minimum 6 months; add complementary feeding gradually; for adequate nutrition use multi-micronutrient powders for home fortification; immunization with DPT, polio, MMR, Hib, pneumococcal pneumonia, rotavirus; height and weight monitoring and recording on WHO growth charts; ORS and respiratory care as needed; vitamin supplementation; insecticide in home and impregnated bed nets, vector control
1–5 years	Malnutrition – stunting, inadequate feeding, lack of iron and vitamin A supplements, and infectious diseases – pneumonia, diarrhea, malaria; childhood obesity	Monitoring and recording on growth chart; counseling, developmental assessment and support; ensure complete immunization; impregnated bed nets, multivitamins for children at risk; for adequate nutrition use multi-micronutrient powders for home fortification including iron supplements; add zinc with ORT for diarrhea; refer children with malnutrition, failure to thrive

Note: HIV = human immunodeficiency virus; STI = sexually transmitted infection; HDN = hemorrhagic disease of the newborn; CHW = community health worker; ORT = oral rehydration therapy; DPT = diphtheria–pertussis–tetanus; MMR = measles–mumps–rubella; Hib = *Haemophilus influenzae* type b; WHO = World Health Organization.

Sources: See Chapters 4 and 6.

World Health Organization. The integrated global action plan for the prevention and control of pneumonia and diarrhea. WHO/UNICEF; 2013. Available at: http://apps.who.int/iris/bitstream/10665/79200/1/9789241505239_eng.pdf [Accessed 11 June 2013].

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high-income countries. Trauma death rates are falling as a result of mandatory improvements in car and road safety, as well as stringent policing to prevent alcohol and drug use among drivers. Occupational safety standards are continuing the decline in occupational mortality. Poisoning deaths from drug abuse are increasing and require improved treatment of substance abuse. The simpler technology of home care allows chronically ill patients to return to their homes with less lengthy, high-cost, and risky hospitalizations. Ambulatory care can be provided safely for many conditions previously requiring hospitalization, which incurred greater cost and danger from hospital-acquired infections.

New technology will emerge, such as synthetic vaccines, which are safer and cheaper than organically grown vaccines; vaccines genetically engineered in basic foods; affordable genetic sequencing, with genetically customized cancer treatments; remote patient monitoring, using Internet and wireless technology to enable patient monitoring and data sharing between health care systems; synthetic blood vessels for replacing damaged arteries; and laboratory-grown organs, to replace damaged organs such as livers. A biotechnological revolution is in the making which will provide a wider array of public health and medical interventions to prevent and cure diseases with safer and less expensive technology.

Preventing maternal and child deaths remains a huge challenge globally. Development of a community-based infrastructure is the fundamental challenge to reach the rural and urban poor where the risks are greatest. CHWs, trained, supervised, supported and preferably salaried, can make and are making huge differences in connecting these high-risk populations to basic health care. The support systems needed are evolving in many countries and should be fostered by the donor agencies, but mainly by the national governments to meet their obligations under the global MDG program and its subsequent iterations after 2015. The basic risks, their prevention and management are indicated in Table 16.17.

While care of the individual mother and child is crucial there are equally important initiatives by national governments such as in mandatory fortification of salt with iodine, fortification of flour with iron, vitamin B complex, including folic acid and vitamin B₁₂ including those used in food manufacturing. Vitamin D deficiency should also be addressed even in sunny climates where dark skin tone and religious customs of total coverage of the body may reduce vitamin D production by sun exposure. In northern climates vitamin D fortification of milk and supplements are essential because of long winters and cloudy weather even in summer (see Chapter 8). Global nutrition programs have been characterized as disorganized and uncoordinated.

The future of public health and health care will see tremendous change and adoption of new modalities of preventing and managing disease: recombinant vaccines will reduce costs and introduce new vaccines, bringing more infectious diseases under control, including viral hepatitis and respiratory and diarrheal diseases. Vaccine technology for cancer and genetic disorders is evolving. Congenital disorders will be controlled by education, screening, and appropriate interventions. Dietary change will help in the control of cancer, as will screening and reduced exposure to carcinogens. It is now established that infectious agents can cause chronic disease, such as *Helicobacter pylori* and peptic ulcer, and cancers such as those of the stomach, liver, and cervix. There are synergies between micronutrient deficiency conditions with infectious and chronic disease, such as folic acid deficiency and birth defects, and these associations open many new vistas for research, preventive breakthroughs, and applied public health.

Health for All means access to care for everyone. This requires sound management of finances and other resources to provide the needed services efficiently and by reducing the waste and extravagances of unnecessary servicing. It also requires a social and physical environment that enables people to experience healthful, satisfying, and productive lives. To attain these lofty goals, broad partnerships or coalitions of health services and providers working with communities and an increasingly knowledgeable and participating general public must be achieved. This is especially important for compliance with immunization, healthful infant and child

nutrition and care, self-care in pregnancy, and healthful adult nutrition. Paternalistic, traditional services of doctors dominating both the health systems and patients are not able to raise the level of patient and community participation needed.

The goal of better health requires a sharing of tasks and resources between the clinical and community levels, and between countries. Assisting countries in developing the staff and infrastructure of epidemiology in infectious and chronic disease is an investment in the frontline of public health protection and self-defense. This is the substance of work by international organizations and bilateral aid. In international partnerships in Europe, the industrialized countries help each other, and this model needs to be applied to promote public health infrastructure in developing countries as well.

SUMMARY

Health for All sounded like a hopeless, idealistic dream when first promulgated by the WHO in 1977. Yet the progress made since then in lowering mortality and birth rates, raising longevity, and improving quality of life has been dramatic. *Globalization of health* means that what happens anywhere is the concern of everyone everywhere, as the world learned with plague in the fourteenth century and AIDS in the late twentieth century. At the same time, globalization means all aspects of health for a population, because of the interaction of health care, economics, and the political priority given to health. Global partnership efforts to contain the HIV/AIDS pandemic advanced greatly with support and adoption of generic antiretrovirals manufactured at very low prices to treat 10 million people with HIV/AIDS in developing countries. Similar efforts with newly successful short course antiviral treatments could provide answers to the HCV pandemic for low and middle income countries. “Large-scale manufacture of treatment to cure Hepatitis C is feasible, with target prices of US\$100-250 per 12 week treatment course” (Hill et al, 2014).

In the globalized world of the twenty-first century, public health of one country cannot be considered in isolation. Globalization has bridged countries together, intensified human interactions, and made international boundaries increasingly irrelevant in the control of disease. *Global health* is a very complex term which is influenced by actions or circumstances in countries other than the one affected directly. Today, the determinants of global health include poverty, environmental degradation, climate change, violence, terrorism, illegal drug trafficking, and international or bilateral trade laws. With all its drawbacks, globalization also has its benefits in the transfer of education, science, and technology, helping to provide the benefits of development from developed to developing countries. Many countries are emerging from economic stagnation with rapid development of industry and trade based on domestic and global

markets. The middle- and low-income countries are experiencing rapid growth in their middle-class populations and trends in disease prevalence of heart disease, stroke, over-nutrition, obesity, and diabetes, and growing gaps between rich and poor. The economic burden of these diseases in developing countries makes public health programs for intervention essential, to prevent them from undermining economic and social development.

Global action means that countries must be committed to health at all levels, including state and local governments as well as voluntary, educational, and many other elements of a society. The potential gain is enormous, and this requires systematic organization and information, with well-defined targets, strategies, and tactics. The WHO Framework Convention on Tobacco Control is a key global public health treaty and is meant to help developing countries to address the tobacco epidemic promoted by the tobacco industry.

Measuring disease (infectious and chronic), family health, special groups in the population, nutrition, environmental and occupational health, organization of public health, management of health systems, comparing with other national health systems, human resources, technology assessment, quality assurance, law, and ethics, all chapter topics in this book, are the substance of the New Public Health. Altogether, they are the subjects of day-to-day life in health systems.

The great achievement of smallpox eradication has been followed by other global disease eradication efforts, and great health and economic benefits have already been achieved. The eradication of poliomyelitis is progressing with coordinated global and country-level activities. In 2012, a total of 223 polio cases was reported from five countries: Afghanistan, Chad, Niger, Nigeria, and Pakistan. India's last case was reported in 2011, but continued control efforts are underway to ensure its polio-free status. As of 16 July 2013, 132 polio cases have been reported from the three remaining endemic countries in which wild poliovirus is still circulating: Afghanistan, Nigeria, and Pakistan. Continuous monitoring and special immunization efforts in still endemic areas are using type 1 oral poliomyelitis vaccines to reduce this most virulent strain, while also addressing type 2 and type 3 areas. In both Pakistan and Afghanistan, polio field workers have been murdered by Islamic terrorists who oppose immunization, which has made continued immunization and eradication efforts in those endemic countries problematic. However, polio eradication is within sight with the sustained efforts of the donors and national governments, as well as international organizations such as the WHO, UNICEF, UNDP, GAVI, Rotary International, and the Gates Foundation.

New emerging diseases continue to threaten to spread out from localized cases. West Nile fever has become endemic in North America and Europe. Dengue, Chagas' disease, Rift Valley fever, and chikungunya have spread

to many countries far from their original habitat. In 2013, MERS-CoV emerged in Saudi Arabia with 90 cases and 45 fatalities (case fatality rate of 50 percent) in what seems to be animal-to-human transmission and subsequent close-contact human-to-human transmission, with the reservoir likely to be the horseshoe bat (CDC, 25 July 2013). This virus has similarities to the coronavirus which caused the SARS pandemic of 2003, from which the global health community learned many lessons and has adopted measures to take those lessons into account. MERS-CoV could become a problem associated with the Hajj pilgrimage to Mecca in 2013.

Lessons learned from the new and re-emerging infectious disease patterns help to strengthen the capacity to meet future challenges such as pandemic avian influenza. The SARS epidemic helped Canada, for example, to develop a strong federal investigative and laboratory capacity to deal with national and global health threats, and China also improved its surveillance capacity.

The experience, skills, and infrastructure of infectious disease control will also bring changes in chronic disease control. New acute and chronic disease challenges will emerge; preparation will increase the chances of coping with them before they reach epidemic proportions. Addressing the global rising tide of CVD and cancer mortality, especially in the low-income countries and the former Soviet Union and many developing countries, is the central challenge of public health for the coming decades. Interventions to reduce poverty and poor nutrition, along with development of health systems that address social inequalities and human behavior, are the major challenges facing countries at all levels of development. These are no less complex and no less important than recognizing the resurgence of infectious diseases, as well as multidrug-resistant and non-communicable diseases, all of which are serious public health problems. The shared predominance of leading causes of death from cardiovascular diseases in high medium and low income countries should reinforce global approaches to the preventive measures that have achieved much success in the high income countries of smoking reduction, hypertension and lipid control, healthy diet and exercise with their greater application in the medium and low income countries.

The conceptual basis of the New Public Health provides an idealized yet practicable model for all countries, including developing countries. This concept has since grown with many influences, including health promotion, health targets, and factors outside the direct domain of public health organizations and health insurance. The important influence of poverty on health can be addressed by poverty alleviation, job creation, urban planning, and education, as well as the foundations of hygiene and environmental health. The New Public Health involves the actual management of health systems and integration of secondary and

tertiary care services of hospitals, and the whole range of programs or services that relate to improving the health of the individual and the society.

Health inequalities within nations and around the globe present an important challenge to public health. Huge excesses in rates of mortality from preventable diseases are still prevalent in many countries, such as those in Eastern Europe, along with slow rates of adoption of current best practices in health protection and health care. Failure or delay in adoption of common policies on fundamentals such as immunization or essential vitamins and minerals in nutritional security are issues that public health and political leaders need to address. New disciplines such as health promotion helped to control HIV before there was a medical treatment. New innovations in public health offer the promise of control of chronic conditions that plagued earlier generations, such as chronic peptic ulcer disease, cancer of the cervix and colorectal cancer. The future will offer more breakthroughs but their absorption into common policies and practices will, as in the past, often be unconscionably slow (Tulchinsky and Varavikova, 2010).

The international health community, through the MDGs, has succeeded, in part, in changing the health agenda of many countries towards prevention, primary care, and health promotion. The development of goals and targets with international sanction helps each country to resist pressure to place most of its health care resources into curative and tertiary services. An international commitment to Health for All has taken on an important meaning in member countries. It has helped national and regional health leadership to tackle the difficult task of changing priorities to an emphasis on primary health care and modern public health.

Coalitions of forces are needed to take up the challenges that the health community cannot do alone. The isolation of health from other sectors, or of parts of the health spectrum from each other, lowers the capacity of all to reach common goals. Networks of international agencies, including the WHO, UNICEF, World Bank, FAO, UNDP, private donor organizations, the private sector, and many others, are needed to face the health challenges and tasks. Similarly, at the national, state, and local levels, globalized approaches and networks of organizations can help to define targets and mobilize the resources needed to achieve them. International partnerships such as WHO and GAVI have declared “the Decade of Vaccines (2011–2020) so that all can live free from vaccine-preventable diseases, both by increasing routine immunization but equally important reducing the time for incorporating the more recently developed and proven vaccines.

It is appropriate to end this book with a dedication pledge taken by graduates of a prominent school of public health in the USA, as a personal commitment for public health professionals graduating from their training programs (Box 16.11). This statement of personal mission and

BOX 16.11 A Public Health Graduate’s Pledge to Public Health

- We as health professionals do hereby commit ourselves to advocacy and action to promote the health rights of all human beings.
- The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being. It is not a privilege reserved for those with power, money, or social standing.
- Health is more than the absence of disease, but includes prevention of illness, development of individual potential, and a positive sense of physical, mental, and social well-being.
- Health care should be based on dialogue and collaboration among citizens, professionals, communities, and policy makers.
- Health services should emphasize equity, accessibility, community, participation, prevention, and sustainability.
- Health begins with healthy development of the child and a positive family environment. Health must be sustained by the active role of men and women in health and development. The role of women and their rights must be recognized, respected, and promoted.
- Health care for the elderly should preserve dignity, respect, and concern for quality of life, and not merely extend life.
- Health requires a sustainable environment with balanced human population growth and preservation of cultural diversity.
- Health depends on more than access to health care. It depends on healthy living conditions and the availability to all people of basic essentials: food, safe water, housing, education, productive employment, protection from pollution, and prevention of social alienation.
- Health depends on protection from exploitation and discrimination on account of race, religion, political belief, ethnic group, national origin, gender, sexual preference, or economic or social status.
- Health requires peaceful and equitable development and collaboration of people.

Source: University of California Los Angeles (UCLA) School of Public Health. Graduation ceremony oath 2013. Confirmed by Dean Jody Heymann; July 2013.

values represents the best ideals of public health and is relevant to the many training programs in public health not only in the USA, but also in Europe and other parts of the world.

Healthy people are more productive than ill people, so investments in health and nutrition, along with education and sanitation, contribute to economic growth. Science, technology, and successful public health practice have shown great achievements in reducing and eliminating many previously devastating diseases while promoting longevity and healthy aging. This is seen in the high-income

countries and increasingly in the middle- and low-income countries as well. Political priorities in resource allocation are crucial to support for health protection, nutritional security, universal health coverage, and societal commitment to reducing economic gaps in terms of relative and absolute poverty. Global organizations for health and the private sector donors are vital to achieving the current MDGs (by 2015). The global efforts to achieve the MDGs, even if only partly successful, show that political action can achieve major results; although not uniformly and satisfactorily in all countries, many have done well. Their follow-up targets will surely add a major focus on the prevention of NCDs, trauma, and mental health, which affect all nations.

Reduction in smoking alone will reduce lung and other cancers. Improved screening and management of hypertension will continue and accelerate the decline in mortality from CVDs. Increasing vaccination coverage and expanding the vaccines to include those against pneumonia and diarrheal diseases will reduce child mortality and save millions of lives. Failure to implement the reduction of lead; to fortify food to eliminate micronutrient deficiencies (the “silent hunger”) of iodine, iron, and vitamin D, and other deficiencies; and to fortify flour with folic acid to prevent birth defects, has meant that the health needs of mothers and children have not been met. Furthermore, non use of alcohol during pregnancy will prevent fetal alcohol syndrome, while malnutrition and overnutrition are factors in much of the global morbidity that produces the most common causes of death and disability.

Public health’s record of achievements should lend optimism to the serious challenges of continuing this progress and facing the issues of an aging population in times of economic slumps and with newly emerging diseases. The achievements of science and technology need support and implementation. New breakthroughs in genetics, nanotechnology, immunology, pharmacology, vaccinology, nanotechnology, and robotics will produce great advances in diagnostics, simpler screening methods, and improved treatments for chronic debilitating brain and neurological disorders. Societal efforts to reduce poverty may be the most important contributor to improvements in health.

The New Public Health is a conceptual framework and methodology for implementation of these lofty, but achievable goals. It addresses policy and management of health systems as well as health promotion and disease prevention so that changes in priorities can be implemented by appropriate shifts in resources to meet the health needs of individuals, vulnerable groups, and national and international communities. Globalization of health is more than ever vital to human well being requiring international consensus and coordination for reducing pollution and its fearsome effects of climate change. Similarly in health infrastructure and human resources global cooperation is crucial to achieve desired outcomes in reducing inequalities both within and between countries. This means reduced inequities, maximum use

of available technologies and statistical, epidemiological, social, and basic sciences of public health with a renewed global commitment to the global ideal of Health for All.

NOTE

For a complete bibliography and guidance for student reviews and expected competencies please see companion web site at <http://booksite.elsevier.com/9780124157668>

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