Demographic Transformation and Socio-Economic Development 2

Maryse Gaimard

Population and Health in Developing Countries

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Demographic Transformation and Socio-Economic Development

Volume 2

Editors-in-chief: Yves Charbit and Ian Pool

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Introduction: Health and Development

The relationships between health and development are well-documented and are widely recognized among experts (Sachs 2006; Severino 2008; Severino and Ray 2010). Health is both the cause and the consequence of development. Research on health in developing countries, which had once focused on the impact of the health of populations on macroeconomic variables, has come increasingly to adopt a microeconomic approach to the analysis of health systems. The notion of development has also changed and developed. The notion of development defined as economic growth has given way to the concept of 'human' development and (more recently) to the notion of 'sustainable' development (Tizio 2004).

The concept of development has changed significantly in contemporary economic thought. The definition of development as economic growth measured based on GDP or per capita GDP has clear limitations. From a sociological perspective, development has also been defined as the social dynamics of a society entering a new stage of civilization. However, in the last two decades, research on development has increasingly incorporated the notion of individual autonomy (in addition to the concept of economic growth) (Barthelemy 2006). The United Nations Development Programme (or UNDP) defines 'human' development as the process of expanding the opportunities available to individuals: 'individuals are the real wealth of a nation. Human development can be defined as a process of enlarging people's choices and building human capabilities (the range of things people can be and do), enabling them to: live a long and healthy life, have access to knowledge, have a decent standard of living and participate in the life of their community and the decisions that affect their lives'. The assumption is that economic growth is a necessary condition for development.

In line with the neoclassical model of growth, the causal link was assumed to be from income to health – i.e. a higher level of income facilitates access to ways of living and to goods and services that contribute to improving nutrition and health, but also results in an improvement of education, which in turn leads to better health and hygiene behaviors. Increased income is also a form of protection against exogenous shocks, including health shocks such as epidemics. 'The analysis of the contribution of health to development was burdened by the general limitations of

the neoclassical model, including the exogenous nature of technical progress and the difficult of accounting for long-term growth because of the hypothesis of diminishing returns to capital' (Moatti and Ventelou 2009).

In the early 1990s, the possibility of a reverse causal link was explored by the Nobel-prize winning economist Robert W. Fogel, who showed that improved eating habits accounted for roughly half of British growth between the end of the nineteenth century and the end of the twentieth century. Progress in the area of food and nutrition can be interpreted as both an effect of income and an effect of health. In 2001, the Report of the Commission on Macroeconomics and Health led by Jeffrey Sachs considered it a definitive fact that the improvement of the health of populations represents a decisive input for the reduction of poverty, economic growth and long-term development, and that this fact has been largely underestimated until now by the public authorities (WHO 2001).

Health: A Factor of Development

Poor health is a factor of social and economic stagnation. In a paper entitled 'Etat de santé et systèmes de soins dans les pays en développement' ('Health and health systems in developing countries'), Stéphane Tizio (2004) described the various ways in which illness and disease impact on human development and growth. According to Tizio, disease results in a loss of individual well-being by causing a decrease in the possibility of consumption: medical care is costly and, in the absence of medical coverage (as is the case in the most underprivileged countries), the resources allocated to health care impinge on the income of households. Disease also causes a loss of current earnings through absence from work and a loss of future earnings as a result of premature death, thus resulting in a decrease of consumption and an inability to meet the global demand at a macroeconomic level. Poor health may also have significant social costs by undermining any attempts to improve individual autonomy and to maintain economic growth.

Today, disease also has a negative impact on future life since disease has an intergenerational dimension impacting the conditions of existence of the descendants and ascendants of the sick person. The demographic behavior of developing countries (characterized by high fertility and mortality rates) results in a vicious circle or 'poverty trap': in the absence of social protection, large families can only devote a very small proportion of their income to each child for food and education. Therefore, their chances of survival are inversely proportional to the number of siblings and to their chances of earning a high income. The intergenerational effects at a microeconomic level are reflected at a macroeconomic level by a high natural increase of the population with a low mean age. The working-age population, GDP per capita and savings rate stagnate.

Finally, according to Tizio, disease entails high costs for society as a whole. High morbidity, combined with the high labor turnover it causes, discourages companies from investing and therefore limits their profitability. High morbidity also discourages tourism, a key source of currency income. When a significant proportion of the

population is affected by ill health, public funds are allocated first and foremost to health expenditures, to the detriment of other social services. As a result, public trust in the authorities tends to decline, while the social services are overrun. The increase of labor productivity, driven by a healthy and well-fed labor force, allows companies to make profits and encourages foreign investors to be less cautious about investing in companies in developing countries. The strong correlation between economic growth and labor productivity is particularly significant in developing countries, where manual labor tends to prevail. 'A healthy population sees its life expectancy increase and its life cycle lengthen. The expectation of future earnings increases with the planning horizon of individuals, who are thus more likely to invest in education and health and to develop savings'.

Moatti and Ventelou (2009) argued that health is a key factor of development. In their view, the first mechanism governing the impact of health on development involves a loss of productivity caused by morbidity and premature mortality and by the fact that healthy workers are more productive and generate higher revenues. At a microeconomic level, research has shown that effective medical care helps to offset the impact of illness and disease on productivity. However, this mechanism may not be sufficient to generate significant macroeconomic effects. For example, despite the proven demographic impact of AIDS (a disease that has almost entirely cancelled out the increases in life expectancy achieved since 1950 in the most affected countries of sub-Saharan Africa), the first macroeconomic models predicted that the epidemic would have an impact close to one percentage point of GDP growth per year. In the current neoclassical model, which served as the basis of early research in this area, the production losses caused by death are partly offset by a mechanical effect of an increase of per capita capital. Couderc et al. (2006) showed that a high level of unemployment (as is the case in almost all developing countries) and a 10 % premature death rate in a given generation as a result of illness or disease, resulting in a proportionally smaller decrease of output (for example around 5 %), are enough for productivity per capita to increase and for the macroeconomic effects of poor health to seem limited.

Other mechanisms governing the impact of health on development assume that health is not a final good but an investment generating significant long-term profits. These models highlight the decisive impact of the transmission of human capital on long-term growth, where human capital includes not only education but also health capital. Analyses of the experience of emerging countries in South-East Asia and of other successful attempts to get out of underdevelopment (Sri Lanka, the Indian state of Kerala, Botswana, Lesotho, Tunisia) illustrate a process in which the beginning of an increase in life expectancy, by extending the temporal horizon of households, fuels greater demand for education and fosters saving behaviors – two key factors for stimulating productive investment. The 'demographic dividend' is also a key factor. If the decline of mortality is accompanied by a decrease of fertility, the two phenomena result in an increase of the working-age population (15–59 year olds) and contribute to an increase of per capita income.

In the area of fertility, a debate has recently arisen over the predicted impact of HIV/AIDS on growth in African countries. Two conflicting views have emerged. For some, the HIV/AIDS epidemic has caused a decline in fertility, resulting in

increased female labor force participation and, in the long term, a positive impact on the economy of the countries affected by the epidemic (Young 2005). By contrast, research by Kalemli-Ozcan (2002) associated continued fertility with a form of insurance against disaster and predicted that AIDS would have a negative impact on the investment in human capital devoted to each child. David Weil, a proponent of the second thesis, proposed to settle the issue empirically. Based on retrospective data relating to 80 countries over the period 1960–2000, Weil showed that, in the past, increases in life expectancy contributed significantly to per capita GDP growth, even accounting for almost 25 % of the differences between countries (Weil 2007). The interaction between health and fertility behavior (on the one hand) and fertility and educational choice (on the other) appears to be a promising avenue for further research on growth dynamics.

At a theoretical level, the application of growth models to the case of AIDS suggests that the combined impact of the epidemic may lead some economies into an 'epidemiological trap' putting their growth regime at risk. Studies in this area have also provided a macroeconomic justification for the involvement of the international community in funding access to antiretroviral drugs. The profitability of the cost per additional year of life has been contested by some health economists. However, it is important to ensure that the new paradigm, which construes the improvement of health as a necessary condition for growth, does not lead to a belief (supported by the majority of humanitarian organizations, but also by some experts) that international aid and health spending simply need to be increased in order to help the populations of developing countries out of poverty.

Health as a Consequence of Development

Like development, economic growth has an impact on the state of health of a population by improving the health system and helping to meet the needs of more people. Economic growth increases the proportion of expenditures devoted to health care. Several studies have provided evidence of the various mechanisms involved in this process.

GDP and per capita GDP growth causes changes in the behavior of households, as shown by Tizio (2004). First, a greater proportion of the resources of households will be allocated to goods and services other than food, consistent with Engel's law. Increases in the standard of living enable individuals to devote more attention to their health. Econometric studies have shown that the income elasticity of demand is inversely proportional to the initial income of households. Secondly, demographic behaviors also change, resulting in a decrease of fertility, a factor favoring the accumulation of human capital for children.

In 1993, the World Bank established that life expectancy increases with per capita income, particularly when income is low (World Bank 1993). Increased income is a determining factor for improving the health of populations independently of medical advances. Finally, economic growth creates new funding possibilities for social

protection systems. Socialized medicine ensures that the needs of the most impoverished are met. An increase in the demand for health care and the increased use of health care services resulting from increased income levels generates additional revenue in this sector.

In short, the health system lies at the heart of the relationship between health and development (WHO 2002b). The mediating role of health between economic growth and human development needs to be supported and promoted by appropriate policies – i.e. sustainable health policies. As such, the organization of health systems is a factor of sustainable development. In this sense, health policies aimed at reforming the structure and funding of health care play a key role in development. However, the positive contribution of health systems to sustainable development remains closely linked to specific conditions relating to the productive and allocative efficiency of health systems and to the equity and social and political legitimacy of health policy reforms.

The basic principle of a health policy is that it must improve the state of health of populations. In order to achieve this, a health policy must be effective. The productive efficiency of health care systems is a key issue here. Efficiency is also determined by the importance given to individual and collective health needs, but also to infrastructure needs. The quality and quantity of health services must be consistent with the needs of the population in terms of primary care and hospital care. An improvement of the efficiency of the health system also requires training health personnel in epidemiology, in particular in order to ensure that they are able to identify the most urgent needs of the population.

A better allocation of financial resources in the health sector requires sustainable long-term funding. Sustainable long-term funding ensures continuity in the provision of medical goods (especially drugs), but also allows for cost recovery (both recurring and non-recurring costs), such as the maintenance of premises. The financial stability of the health care system also contributes to extending the system through the development of new infrastructures, but also helps to extend its field of intervention (treatment of new diseases, extension of the field of public health, etc.). The financial dimension of the long-term sustainability of the health system and therefore of development raises a number of questions relating to public choices. 'At a microeconomic level, changes in the method of payment of health care providers – i.e. fee-for-service, prepayment (socialized medicine or private insurance), etc. – produce different behaviors among healthcare actors that need to be taken into account. At a macroeconomic level, the identification of funding networks is also a prerequisite for determining the sustainability of the health system' (Tizio 2004: 112).

Health policy may contribute to development by reducing health inequalities. In developing countries, the unfair redistribution of wealth has a negative impact on growth. In order to offset the negative impact of unfair redistribution, health policies must contribute to removing the obstacles impeding access to health care. Inequalities are not merely financial; they may also be geographical, social and cultural.

There is evidence to suggest that the relationship between increased health spending and the improvement of health in developing countries is less strong than in developed countries, although the relationship can be strengthened provided

public spending targets the poorest sections of the population. The weak relationship between public spending and the improvement of health in developing countries can be explained by the impact of health systems affected by diminishing returns, significant inefficiencies and major imbalances reducing their capacity to absorb aid flows (see Chap. 7).

Governments cannot afford to ignore the risk of macroeconomic imbalances caused by increased health spending. The dependence on foreign aid can easily become significant in the case of vertical programs for the fight against illness and disease: in the majority of sub-Saharan African countries, the rapid increase of spending on AIDS is explained by the fact that over 50 % of the subsidies come from international aid. The wage increases required to retain health professionals and to address the human resources crisis in public health systems may affect the public service as a whole and contribute to increasing the level of public debt. The issue as to whether governments should focus on health care investments or other social services remains unresolved (Moatti and Ventelou 2009).

A recent study by the International Monetary Fund (IMF) found that the fact of devoting an additional 1 % of GDP to the health system in low-income countries may significantly reduce child mortality. However, the study showed that the overall impact on 10-year growth of a similar increase of investments in education or improved governance remained more significant.

Demography and demographics are at the heart of the issues linked to the health of populations in developing countries (Ferry 2007; Lery and Vimard 2001). First, the notion of 'underdevelopment' was associated until relatively recently with population growth. After World War Two, significant differences in population trends emerged between the North and the South. The world was divided into two large groups: developed countries, characterized by slow population growth, and the Third World, in the midst of a population boom (Charbit 2002). At the time, population growth was considered to be a major obstacle to economic and social development. At the third World Population Conference held in Bucharest in 1974, developed countries emphasized the urgent need to reduce population growth, while developing countries adopted a pro-growth perspective, thus contesting the existing world order. The two camps eventually came to an agreement and a consensus gradually emerged that population growth needed to be controlled (the 1980 conference in Mexico City and the Cairo conference in 1994 were key events in this respect). Although an excessively high population growth rate generates new tensions in weak economies, it is no longer a key factor of development. Most countries in Asia and Latin America have successfully controlled (or are in the process of controlling) their population growth, though without experiencing economic development.

Health questions have also long been a key area of research in demography. Demographers, like epidemiologists, seek to identify diseases in populations. Their aim is twofold: to measure the incidence of disease in a population and to identify the determinants of disease. Demographers and epidemiologists often use similar data sources such as vital statistics, population surveys and cohort studies. Historically, epidemiologists were the first to develop an approach to morbidity and mortality aimed primarily at measuring the incidence of diseases, their etiology,

their prevention, and the evaluation of the treatments designed to combat them. More recently, demographers have begun to use measures of morbidity as an additional source of data by including epidemiological questions in demographic surveys, particularly in developing countries (see for example the demographic and health surveys program). The aim of these studies is to describe and analyze reality in order to identify the determinants of disease and death or to assess the effectiveness of the efforts aimed at reducing morbidity and death.

While public health epidemiologists focus primarily on individual risk factors (such as lifestyle), demographers are more sensitive to the social and economic context determining behavioral variables. Demographers examine morbidity and mortality data based on risk exposure (the cause) in order to measure the frequency of the result (the effect) and to calculate the rates applying to different demographic categories. By contrast, epidemiologists examine the different risk exposure levels of groups of individuals that have experienced different outcomes. For example, in examining the relationship between maternal education and child survival, an epidemiologist will typically seek to estimate the level of education of mothers whose child died and to compare it to the level of education of mothers whose child survived. This approach is the opposite of the demographic method, which involves measuring the risk of child death based on the level of education of mothers. Demographers tend to examine health in terms of its impact on life expectancy at birth (mortality, causes of death, healthy life expectancy, etc.) or in terms of social determinants, or by studying the epidemiological history of populations. Mortality (which is clearly directly related to health) is a major area of demographic research that developed long before the term 'demography' had even been coined. For example, John Graunt examined mortality based on death records in order to monitor plague epidemics.

This book provides an overview of the health of developing nations in the early twenty-first century (Gaimard 2008). The basic assumption is that the health of a population is not independent of broader demographic trends and follows the health transition model. After re-examining the main concepts used in population health (Chap. 1), the book will examine the health transition in developing countries, a process that has resulted in a double morbidity burden (Chap. 2). Chapter 3 will present the indicators used to measure the health of a population. An examination of mortality in developing countries (Chap. 4) will serve to highlight the high rates of child mortality in these regions. Chapter 5 will focus on women's health. The analysis of morbidity (Chap. 6) will highlight the double burden weighing on developing populations. Finally, Chap. 7 will provide an analysis of health systems in developing countries.

Chapter 1
Health, Morbidity and Development: Definitions and Concepts

There are different approaches to population health. Public health focuses on epidemics and acute and chronic diseases, on causes and risk factors, and on the spread of diseases. The aim is to prevent illness and disease, to reduce their impact and to promote health. Health system managers and politicians have different conceptions of health that reflect their specific objectives and concerns, including the well-being of the population, the impact of disabilities, the cost of illness, the assessment of health inequalities, and the definition of priorities. Individuals are generally only aware of their health when they experience illness or disease. Health is a necessary condition for suffering an illness or a disease since it is often through disease that an individual becomes aware of their state of health. Therefore, it is important to reconsider a number of definitions and concepts. The first question is: what is health? The answer to this question will require an analysis of the concepts of illness and disease. Death can be seen as the result of a decline of vital forces resulting in a transition from health to the various manifestations of morbidity. Health and morbidity are complex concepts that need to be defined before examining the relationship between health and human development, but also between health and social and economic development.

1.1 Health: A Relative Notion

Health is both a biological and a cultural, individual and collective reality, and is therefore difficult to define.

1.1.1 The Definition of Health

Dictionaries define health as a good physiological condition or as a state in which the body operates harmoniously. Researchers have provided different definitions of health. According to René Dubos (1973), 'health is a situation in which the body

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reacts by adapting while preserving its individual integrity'. For René Leriche (1936), 'health is life in the silence of organs', while Jacques Dufresne (1985) argued that 'health is not having to think about health'.[1] The World Health Organization (WHO) takes a broader view of the notion, defining health as 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'.[2] The definition provided by the WHO was included in the preamble to its 1946 constitution and has remained unchanged ever since. The WHO definition implies that all the basic needs of the individual are met (i.e. affective, health-related, nutritional, social or cultural needs). However, according to Catherine Gourbin and Guillaume Wunsch (2005), the definition given by the WHO confuses the concepts of health and well-being since health is merely a component of well-being. It essentially draws on the personal experience of an individual, thus combining the two dimensions of health – i.e. objective and subjective health. According to Gourbin and Wunsch, '[t]he definition of health is specific to each individual and, as such, it is difficult to identify a common denominator for providing an aggregate measure of the level of health of a population'.

In the Baule society of Cote d'Ivoire, seers and clairvoyants have traditionally been responsible for defining the criteria of normal and pathological states, 'of an unfortunate possession requiring treatment or a fortunate possession needing to be cultivated'. These criteria are normative factors that serve to justify the existing social order. In every era and culture, the dominant models and conceptions of health have tended to attribute specific causes to diseases, such as the spirits of the land or of evil, alcohol, tobacco, the gene pool or viruses.

Roberto Mordacci (1995) argued that health implies adaptation and fulfilment: 'a healthy person can adapt to the physical or mental stressors of the environment, and health is one condition necessary for individual physical and psychological self-realization'.[3]

Perceived health is strongly associated with the specific life history of individuals, but is also shaped by their cultural environment and by their ability to adapt. Therefore, health is a highly complex notion shaped by the experience of each individual, their values, the information available to them and their understanding of health and health-related notions. As such, the concept of health varies in different times and places.

Today, it is widely accepted that health (whether good or bad) involves a continuum of states ranging from perfect health to death, through disease and illness or any other form of physical or mental deterioration or alteration. Individuals are generally only ever aware of their health when confronted with illness or disease. Health is also a necessary condition for suffering disease: it is often through disease and illness (their own or others') that individuals become aware of their state of health (Renaud 1985).

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[1] Quoted in Gourbin and Wunsch (2005: 5).

[2] Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19–22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948.

[3] Quoted by Gourbin and Wunsch (2005: 6).

1.1.2 Health: A Relative Notion

Health is a relative concept and is often not defined as a corollary of the absence of disease since people with various complaints may sometimes be viewed as being 'in good health' if their disease or illness is controlled by a treatment. In the mid-twentieth century, diabetes experts spoke of 'insulin health'. Today, this conception of health has become the dominant model in developed countries. Beyond a certain age, it is highly unusual for individuals not to suffer (for example) from a refraction disorder or high blood pressure. By contrast, some illnesses or diseases can remain asymptomatic for long periods of time. In such cases, individuals who feel healthy may not necessarily be healthy. More specifically, an individual may not suffer from any detected illness or disease but feel unhealthy; conversely, an individual may feel well but be affected by an illness or disease with no apparent symptoms. In the first case, health is subjective (i.e. perceived health) since the individual is subjectively unwell but objectively healthy. By contrast, in the second case, the notion of health is objective since it is based on a diagnosis by a specialist.

Perceived health (a subjective measure of health) indicates how individuals experience their state of health and reflects the feelings, ideas, and beliefs that individuals have about their health. Perceived health varies in different individuals, although they may be in the same general state of health. In this sense, there may be a discrepancy between perceived health and actual health. Perceived health is determined by individuals' health expectations and their understanding of their state of health, including diagnosed or undiagnosed illnesses or diseases and the nature and severity of their illness or disease. Psychological disorders can also have an impact on perceived health and may result in the appearance of symptoms by reducing the sense of well-being.

Most of the data on health are subjective health data based on one-time or repeated surveys. Medical sociology has developed a range of scales for assessing the various components of health. Ann Bowling (1991) provided a useful description of these scales. Some scales measure mental well-being, while others focus on the happiness and satisfaction of individuals, the physical abilities of individuals or the size of their social network. Measurement scales, often developed by health professionals, may not necessarily take into account the reality experienced by individuals.

Personal conceptions of health are heavily influenced by the life history of individuals. In this sense, perceived health is not simply a matter of individual behaviors since behaviors are also heavily determined by the social, cultural, economic and health environment. Individual behaviors are initially the product of general attitudes about health and the body that are themselves linked to culture. These attitudes are manifested by behaviors determined by the resources available to each individual, which are in turn largely determined by the place of individuals in society. Health and social practices determine behaviors. The medical knowledge of individuals varies significantly in different cultures and periods according to the general state of knowledge, the existing value systems, and the diffusion of information. These factors have a profound impact on perceived health, but also have an impact on the use of

health systems, thereby determining (and changing) the level of diagnosed morbidity. Therefore, health needs to be seen as a dynamic concept that varies from one individual to another, but that also changes within the same individual over time and according to circumstances even if the individual remains in good health. The concept of health in the developing world differs significantly from the concept of health in developed societies.

In some societies, particularly in the Western world, health has become a right, in the same way as the right to education, freedom of speech, security and work. This conception of health is reflected in the WHO slogan 'health for all by 2000'. All rights imply duties. In other words, if individuals have a right to health, the assumption is that they also have the duty to protect their own health and the health of others. Individuals are responsible for the lifestyle choices they make for themselves and for their family. In a society in which the right to health is a basic principle and where the cost of health care is becoming ever greater, there is a temptation to determine access to health partly on the basis of individual responsibility. The implication is that the consequences of high-risk behaviors may not always be borne by society. Yet it is important to recognize that many risk factors such as alcohol, tobacco or drugs are often more prevalent in the most disadvantaged social groups.

Gourbin and Wunsch argued that every individual has a health capital at birth that varies from one individual to another and improves or declines over time, thus influencing the individual's perception of their health. The health capital of an individual can improve as a result of factors such as the place of children in society, the role of parents, vaccinations, lifestyles, increased levels of education (at an individual and social level), and the improvement of health infrastructures. However, a range of individual and collective determinants may offset the positive impact of these factors. These may include high-risk behaviors (alcohol, tobacco), unhealthy environments, and malnutrition. 'Over time, the negative factors prevail over the positive factors, resulting in a gradual reduction of the health capital, in illness or disease, and, eventually, death. The declining trend over time is partly offset by periods of temporary capital increase, which are then eroded by new external or internal attacks on health' (2005: 9).

Since individuals are generally over aware of their health in periods of illness or disease, it is important to define the concepts of illness and disease and to examine the associated concept of morbidity.

1.2 Disease and Morbidity

In ordinary language, the notion of morbidity refers to anything related to illness or disease. The dictionary of epidemiology defines morbidity as 'any subjective or objective deviation from a state of physiological or psychological well-being'. Morbidity can be defined as the prevalence of disease in a population. The analysis of morbidity in a given population raises two major difficulties: the definition of illness and disease and the type of measured morbidity.

1.2.1 Illness and Disease: A Difficult State to Define

Unlike the majority of demographic events (such as births and deaths), illness and disease are far less definite events. According to medical journals, illness and disease have long been seen as strictly biological or exclusively psychological phenomena. However, these definitions tend to ignore the social nature of illness and disease. The detection of illness and disease and the name given to them vary widely in different periods and cultures according to the state of medical knowledge and their prevalence within the population. They also vary according to the existing social norms (Prioux 1998). Many studies have shown that the social construction of illness and disease is not a myth but a reality found in all historical periods.

Jean-François Chanlat (1985) argued that in the Upper Paleolithic, morbidity was characterized by a predominance of traumatic accidents and by widespread chronic osteoarthritis (rheumatism). By contrast, Chanlat found no evidence of tooth decay or tuberculosis, syphilis or rickets. The Neolithic saw the emergence of a new mode of human organization characterized by increasing sedentarism, agriculture, and animal husbandry. A range of new pathologies also emerged, such as deficiency diseases (scurvy, tooth decay, and rickets) and various infectious diseases (tuberculosis, malaria). From Antiquity to the eighteenth century, morbidity included periodic epidemics but also widespread infectious diseases (influenza, leprosy, typhus, diphtheria, smallpox, etc.). Both urban and rural areas were major sources of infection. One of the main causes of the abnormally high death rate was the social organization of communities. As a result of economic development, major social changes and new ways of living resulted in an increase of chronic diseases. The impact of social inequalities on disease and death is also well-documented. In short, the nature of morbidity at any given time is shaped by the prevailing sociocultural context. In this sense, disease is not merely a biological or physiological state – a fact that all forms of public health action need to take into account.

The definition of disease also raises the question of what is normal and what is pathological (Sermet and Cambois 2005). In other words, where does disease start and where does normality end? What may be normal for one population in a given culture may not necessarily be so for another population. Likewise, what might have been normal in the past may no longer be normal today, just as what is normal at 60 is not always normal at 20. A normal clinical state may for example conceal a disease at a subclinical stage. The concept of disease is thus difficult to define and identity. It is equally difficult to provide precise dates for a particular disease or illness. When does a disease start and end? When may an individual be said to be cured? The detection of the beginning of the disease is clearly dependent on the state of medical knowledge among doctors and patients, who may detect the signs of illness or disease at an earlier or later stage. Provided it is not fatal, the end of the disease (i.e. recovery) is also difficult to determine. In short, there is a continuum between what is normal and what is pathological both at the beginning and at the end of a disease.

The recognition of a state as a disease or illness is not universal, and there are many examples of significant cultural variations in the perception and definition of

illness and disease. Catherine Sermet and Emmanuelle Cambois gave the example of hematuria associated with schistosomiasis, an endemic parasitic disease in certain regions of Africa, which, in some cultures, is considered to be a normal phenomenon not requiring any medical treatment. The case of hematuria raises the question of determining what is normal. While there is a tendency to see the Western model as the universal norm, some authors (Young 1998) have argued that the Western conception of health and illness is merely the reflection of a specific cultural tradition and that 'reality' and 'objectivity' are social constructions. The role of cultural phenomena is particularly important in the area of mental health. Many authors have highlighted the extent to which syndromes are linked to specific cultures. 'Culture-bound syndromes' are only genuine illnesses or diseases in specific societies but are not recognized in the health models of other societies. For example, the *mal ojo* of Mediterranean and Hispanic-American populations (a condition involving sleep disorders, tearfulness or diarrhea) is attributed to the diabolical eye of a stranger, the evil eye. Other pathologies such as bulimia and anorexia are thought to be specific to Western countries (Basch 1990).

Several models of illness and disease have developed in different societies and throughout history. Gourbin and Wunsch (2005) distinguished between exogenous and endogenous models of disease. The exogenous model posits that illness and disease are accidents caused by the effect of a foreign body (whether real or symbolic) in the patient. In different times and places, disease has been thought to be caused by a supernatural power or by a harmful agent perceived as being naturally present in the environment. In this conception, disease is considered to pose a potential threat to the stability of the social order – a threat that society must control through medicine. In this sense, disease can be seen as a deviation from the social norms governing the roles and duties of individuals in society. Although originating outside the patient, a disease may nevertheless be caused by the patient, who might have been able to avoid it if s/he had not violated a taboo or adopted a high-risk behavior. If the cause of the disease is external to the individual, the assumption is that recovery must also come from outside. In different cultures, the point might be to outwit fate or to seek appropriate medical treatment. As a foreign body, the disease must be expelled through ritual purifications, bleeding or antibiotic therapy.

By contrast, the endogenous model defines the cause of a disease as a general imbalance in the body. For example, there may be an infectious agent that can only develop in a favorable environment. In this sense, the disease partly originates from within the individual. The endogenous model is found in areas of psychosomatic medicine such as psychoanalysis and homeopathy. The conflict between the two models explains why there is no single definition of morbidity, but rather multiple conceptions of disease and (therefore) many forms of medicine. Even in Western societies, modern treatments have not supplanted psychosomatic treatment or healers and bonesetters. Likewise, in African societies, the symptomatic treatment of a disease may be entrusted to a clinic or hospital, while its etiological treatment may be carried out by the village seer or healer (Zempleni 1991).

Claude Bernard argued that health and illness are not two opposing states, but the result of simple physiological changes representing stages in a continuum ranging

from health to illness. Doctors approach health and illness within the framework of an interpersonal relationship with the patient.

1.2.2 Illness and Disease: The Difficulty of Observation

Like epidemiologists, demographers seek to identify illnesses and diseases in a given population in order to assess the prevalence of health conditions. However, disease is difficult to define and date and does not involve formal registers such as births and deaths, particularly in developing populations. The analysis of morbidity requires an analysis of illnesses and diseases.

A distinction is usually drawn between three components of morbidity, according to the source of information: self-reported (or subjective) morbidity, diagnosed morbidity and objective or measured morbidity.

Self-reported morbidity is directly collected from individuals and is sometimes described as experienced or subjective morbidity. Every individual has a specific conception of what is normal and what is pathological and has a particular scale of values for defining complaints and naming them. Self-reported morbidity is used to estimate the needs of a population and the demand for health care, but only provides a partial view of the illnesses or diseases of individuals, since no one can claim to know all the pathologies affecting them, particularly in cases where the clinical manifestations of the disease are not yet detectable. It is also important to note that the statements of individuals may contain voluntary or involuntary omissions. Self-reported morbidity is generally measured based on demographic surveys known as 'health surveys'. Many countries throughout the world conduct this type of survey.

A wide range of individual and environmental factors determine the prevalence of self-reported morbidity without affecting actual morbidity. The prevalence of self-reported morbidity is shaped by the social and cultural characteristics of individuals and by their level of medical knowledge and state of health, but also by social organization, the environment and medical development. The evolution of diagnostic methods and the provision and quality of health care mean that certain illnesses or diseases can become easier to detect and identify. Changes in society also cause changes in health expectations and demands. The prevalence of self-reported morbidity also depends on the specific characteristics of the illness or disease. For example, it is easier to recognize an acute disease with clear, well-defined symptoms than an illness or disease with less apparent and more episodic symptoms (e.g. seasonal allergic rhinitis) and that will not be reported. The methods used in health surveys (type of question, method and period of data collection, etc.) also vary widely and may influence the responses of participants.

Diagnosed morbidity refers to diseases diagnosed and treated by medical professionals. Diagnosed morbidity is also assessed in epidemiological surveys aimed at identifying the prevalence and causes of a disease in a given population. A number of diseases and illnesses have long been subject to compulsory declarations, although the list of these diseases has varied in different periods. A range of data of this kind

are recorded in many countries – for example, notifications of infectious diseases, chronic disease registers (in particular cancer), hospital statistics, and work-related illnesses and accidents. Declarations are used to monitor AIDS trends in many countries throughout the world. Diagnosed morbidity is measured based on hospital data or the reports of health monitoring networks and is used to diagnose the presence or absence of pathologies in a population and to determine their severity.

Finally, objective morbidity (or measured morbidity) is defined as the real level of morbidity based on the current state of medical science. Objective morbidity is measured based on routine examinations carried out on an entire population or a specific subpopulation (school children, company employees, etc.). A number of large-scale demographic health surveys include a medical examination conducted on all or part of the sample, such as the NHES (National Health Examination Survey), set up in the United States in the 1960s. Since then, health data collections have developed significantly, mainly in developed countries. Because of the complexity of their implementation, most national or regional surveys that include a medical examination component are limited to the study of a specific pathology such as cardiovascular disease or cancer.

The only type of morbidity that can be easily assessed is diagnosed morbidity. Health data can be used for developing indicators. The measurement of morbidity will be examined in Chap. 3.

1.2.3 Death

The outcome of an illness can be fatal and lead to death. In this sense, death is not an instantaneous or abstract phenomenon but a process and an experience that occurs over time in the final stages of life. The process of death involves a range of people (the dying person, their family, colleagues, friends and, increasingly, their medical entourage) and has major consequences for the survivors.

The definition of death varies according to the state of medical science. Today, death is no longer seen as a unique event involving all vital functions at the same time. As a result of the development of modern medical techniques, an individual who in the past might have died can now be kept alive through prolonged intensive care. Current medicine defines the end of life as brain death, the basis of a death certificate. As noted by Gourbin and Wunsch: ‘Brain death may be diagnosed if four clinical conditions are met: total loss of consciousness and absence of any spontaneous activity apart from reflex responses, absence of reactivity of all cranial nerves, absence of spontaneous respiration and a flat electroencephalographic pattern. All circumstances that may stimulate death must be controlled within a sufficiently long observation period (12–48 h, depending on age)’ (Gourbin and Wunsch 2005: 11).

In the same way as health and illness, the definition of death varies in different periods and societies. Representations of death also tend to vary in different populations. The conception of death and the rituals surrounding death vary according to the prevailing socio-cultural context. Every culture and every period devise their

own strategies in order to cope with death and develop their own specific rituals in order to transcend death.

In traditional African societies, where society takes precedence over the individual, death is often an object of public ceremonies and rituals (Thomas 1982). In these societies, and indeed in most developing countries, death is part and parcel of life and is a central part of daily life given its high prevalence and the many tales and proverbs involving death. Death is seen as simply a moment in a process encompassing life and extending beyond death. The vital principle is separated from the body to live on in eternity. In this sense, death is part of the present and can be appealed to in order to solve the problems of everyday life. The dead are viewed as ancestors with new functions. The fear of death is just as present in these societies as it is in the Western world, although it is regulated and channeled through rites and borne by faith and belief. The key difference between the West and the African tradition lies in the representation of the self: 'on the African side, there is a participative and socially regulated conception, while on the Western side, there is a heightened sense of individuality faced with the dereliction of anonymity. The result is highly divergent attitudes toward death and dead people: on the one hand, the rejection of the break between life and death and the living and the dead; and on the other, a double confirmation of the break' (Thomas 1982: 251).

In Western societies, death has traditionally been a matter for the individual (as opposed to the family and society). However, some authors have argued that since the middle of the nineteenth century, death in the Western world has increasingly become a public matter. The assumption is that with the introduction of death certificates, death has come to be defined and governed by mortality statistics aimed at defining the phenomenon at the level of entire populations. The aim is to identify the average age at death or sex-specific and cause-specific death rates. In the West, death has thus become an object of rational and mathematical representation (see Chap. 3).

1.3 Conclusion

Health and illness are biological and socio-cultural realities, as well as individual and collective realities, and vary significantly in different eras and populations (Laplantine 1986).

Research on health is based on a negative premise since health is construed as the absence of illness or infirmity. In this sense, health statistics provide statistical information about deaths, diseases and disabilities of different kinds and origins: vital statistics, medical causes of death, infectious diseases requiring a compulsory declaration, disease registers, hospital morbidity databases and population surveys. The weight and significance of the indicators used to measure the various dimensions of the concept of health may vary in different cultures and social classes, at different ages, for different illnesses and for different genders.

The study of morbidity in a given population involves recognizing and assessing the prevalence of health conditions based on the number of ill people and the type

of illness or disease suffered by these individuals. Historically, the field of morbidity initially focused on epidemics and infectious diseases, before being extended to include chronic degenerative diseases, and finally covering the entire field of the impact of illness and disease. The relationship between morbidity and mortality has weakened in developed countries, but not in the developing world, where death is still often the outcome of morbidity.

Chapter 2
The On-Going Health Transition in Developing Countries

The state of health of a population and the prevalence of certain conditions are closely linked to the current state of the health transition in different regions of the world, causing a double morbidity burden to weigh on populations. A study of the health of populations in developing countries requires seeing them in the global context of the health transition. It is important to examine the different aspects and forms of these transitions in order to make collective decisions about population health.

2.1 The Health Transition

The decline of mortality is accompanied by a change in the health profile of the population, a process known as the 'health transition'. The concept of 'health transition' refers to the combined effect of factors resulting in a decline of mortality and an increase in life expectancy. These advances involve a radical change in the epidemiological profile of the population as a result of the decline of various pathologies. The health transition is the corollary of the demographic transition in terms of the causes of death and morbidity. The assumption is that for the first time, all infectious diseases are in decline and are not replaced by other pathologies maintaining a high rate of mortality. Experts began to talk of an 'epidemiological transition', a concept first theorized in the early 1960s. Following the spectacular decline of cardiovascular diseases in Western countries, a semantic shift toward the concept of 'health transition' began to occur. Compared to developed countries, the health transition occurred much later in developing regions, where morbidity and mortality trends have disrupted the health transition model, a key characteristic of modernization.

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2.1.1 The Health Transition Theory

The epidemiological transition theory was defined by Abdel Omran in 1971 in an attempt to summarize the different factors of the secular evolution of mortality. Omran's theory is based on the articulation of three epidemiological 'ages':

– 'the age of pestilence and famine';
– 'the age of the decline of pandemics';
– 'the age of degenerative diseases and social diseases'.

The first age is characterized by the predominance of infectious and parasitic diseases (communicable diseases). The great endemics determined the average level of mortality and, in combination with famines, epidemics determined its fluctuation. In studying the death registers of the city of London in the seventeenth century, John Graunt showed that three quarters of deaths in London could be attributed to infectious diseases, malnutrition and maternity complications. In the first age, corresponding to the pre-demographic transition period, life expectancy at birth was below 30.

In the second age, epidemics became increasingly rare, endemic infectious diseases decline, resulting in decline of mortality and a reduction of its fluctuations. Life expectancy increased significantly, rising from under 30 to above 50. These changes first occurred in the North West Europe in the eighteenth century, before gradually spreading to the rest of Europe and eventually reaching southern countries in the twentieth century. Europe is not entirely rid of all epidemics, although cholera, which replaced the plague, had a lesser impact, and the new epidemic was curbed much faster than previous epidemics. Among the major epidemics, tuberculosis, which initially spread as a result of industrialization and urbanization, began to recede at the end of the nineteenth century. 'For example, in France, the development of industrial capitalism under the Second Empire was accompanied by a pause in the decline of mortality, but mortality began to increase again in the 1880s, and was only stemmed by the two world wars' (Meslé and Vallin 2005: 250). The second age is nothing but the transition from the first to the third age – the process that enabled the transition from the old mortality regime to the new regime.

According to Omran, the third age is characterized by a decline in the increase of life expectancy, which tends to level out. A number of traditional causes of death continue to recede, but this decline is increasingly offset by the rise of new endemics – 'degenerative diseases' (cardiovascular diseases, cancer, diabetes, metabolic disorders) and 'social diseases', which, according to Omran, include: 'the effects of radiations, accidents, work risks, carcinogens present in the environment or industry and food additives'. According to Meslé and Vallin, the increase of mortality as a result of degenerative diseases is debatable. For example, they showed that in France, the apparent increase of mortality as a result of cardiovascular diseases is precisely that – apparent. By correctly distributing deaths for ill-defined causes (as far back as they could go), the authors found that cardiovascular deaths have continually declined. However, the relative contribution of cardiovascular diseases

to the overall mortality rate has steadily increased. In the case of social diseases, there has been an explosion of mortality. However, the factors noted by Omran are not necessarily the most determining factors, since smoking and alcoholism (not referred to by Omran) are among the most important determinants. In the case of accidents, the most significant are road accidents, since domestic accidents and work accidents are in decline.

Aside from the reservations expressed by Meslé and Vallin, the three ages proposed by Omran are a relatively accurate reflection of reality up until the late 1960s (when he wrote his first paper). In the 1960s, the increase in life expectancy in developed countries was beginning to slow down, and even to level out or decline (particularly in Eastern Europe). For example, in France, the 1960s were marked by a stagnation of life expectancy among men and slower progress among women. At the time, many inferred that life expectancy in the most advanced countries had almost reached the limits of human nature (Vallin and Berlinguer 2005). In 1952, Jean Bourgeois-Pichat produced 'table of maximum biological mortality' showing that the maximum possible life expectancy was 76 for men and 78 for women. To establish the first world population projections, the United Nations submitted in the mid 1980s that all populations would converge toward a life expectancy of 75 (United Nations 1985).

The limits of Omran's model soon became apparent. In all Western countries, the increase in life expectancy resumed in 1970s as a result of the decline of cardiovascular diseases. A number of authors began to speak of a fourth phase of the epidemiological transition. According to Olshanski and Ault (1986), the diseases responsible for death remain unchanged, but ages at death have increased. According to Rogers and Hackenberg (1987), the world has entered a new era in which significant progress is being made and will continue to be made as a result of the adoption of individual behaviors more conducive to health.

To Meslé and Vallin, the notion of adding a fourth phase to Omran's model of demographic transition seemed highly debatable. Omran's idea was based on the shift from a permanent old regime to a permanent new regime, after a transition to lower mortality. 'We might say that the transition phase was extended, while keeping the same explanatory model in three "ages"'. However, this would amount to a failure to take into account the fact that the new era of progress that began in the 1970s is based on a major epidemiological change, the cardiovascular revolution, which, while following it, needs to be clearly distinguished from the collapse of infectious diseases' (2005: 252). It thus seemed preferable to Vallin to adopt the model proposed by Frenk et al. (1991) referring to a health transition that includes a first stage (the stage described by Omran) of increased life expectancy essentially as a result of the decline of infectious mortality, followed by a second phase, governed by the decline of cardiovascular diseases, and thus to leave the door open to other subsequent stage (relating to cancer or senescence).

This change in the role of the different causes of death is accompanied by an equally radical change in age-related death rates. Initially, the increase in life expectancy is almost entirely due to the decline of infant and child mortality. The improvements gradually spread to the adult population, causing the adult mortality rate to drop. In the last period, the most significant factor is the decline of elderly mortality rates.

2.1.2 The Factors of the Health Transition

The factors of the health transition have been the subject of heated debates, focusing in particular on the role of medical advances and economic development and the importance of sociocultural changes.

In the 1960s, there was an almost universal consensus that attributed most of the progress in the area of health to medical advances: with Pasteur's discoveries and antibiotics, the assumption was that we had all the resources we needed to fight against infectious diseases. Since World War II, the new medical techniques have spread throughout developing countries and have shown their effectiveness in populations still exposed to infectious risks. Some authors (for example Paul Demeny 1965), attributed no role to economic and social progress in the decline of world mortality in the decades following World War II. Others considered that the increase of life expectancy in England in the eighteenth and nineteenth centuries was solely due to medical progress, while others still maintained that the decline of mortality in nineteenth-century England was essentially the result of advances in nutrition. Taken in isolation, none of these factors can account for health progress. The reality is far more complex and has varied widely over time and in space.

Mortality began to decline in the eighteenth century in Europe as a result of successful attempts to control the large-scale epidemics of the past (measures to protect the population, rather than medical progress) and the increase of available foodstuffs following the development of agriculture and the improvement of transport and storage conditions. In the nineteenth century, economic progress, based on industrialization and urbanization, stopped the increase in life expectancy. Increasing numbers of people were subject to appalling work and living conditions and lived in unsanitary urban areas. Pasteur's discoveries led to a new decline in mortality and a new increase in life expectancy, although medical progress was (once again) supported by improvements in hygiene, food preservation and education. This double progress (medical and sociocultural) largely contributed to the control of infectious diseases, in a general context of economic and social development. Major new improvements in medical techniques were made in the 1930s, with the arrival of sulfamides, followed by antibiotics in the 1940s. In developed countries, the spread of these techniques was promoted by the gradual introduction of social protection systems.

Once infectious and parasitic diseases were controlled, the health transition continued in the most advanced countries with the control of chronic conditions such as cardiovascular diseases. However, the second stage depends on more complex factors. At a medical level, there was no equivalent of the vaccinations of antibiotics developed to combat infectious diseases, but instead a combination of very different interventions ranging from a anticoagulant and beta-blocker treatments (among others) to pacemakers and heart bypasses, but also the introduction of emergency medical services. Strictly medical prevention is difficult to set up: the point is no longer to vaccinate but to continually monitor certain parameters as

risk indicators (blood pressure, cholesterol rate). In addition, while it easy to change an environment that promotes infectious diseases by taking measures aimed at decontamination and the supply of drinking water (among others), the environmental circumstances favoring cardiovascular diseases cannot be changed by the complex interplay of global policies and changes in individual behavior. The authors cited the example of smoking. The decision to stop smoking is an individual decision, but is unlikely to be made smoking retains a positive cultural image. Political action and increased individual awareness are thus closely interdependent. Significant changes are even more difficult to bring about in the case of eating habits. 'It is not only the consumption of a clearly identified single product that is at issue, but the subtle balance between the quantity, quality and nature of the ingredients of the daily menu. At a political level, the message is much more difficult to promote, while at an individual level, it is much more difficult to change the eating culture' (Meslé and Vallin 2005: 259).

An increased awareness of the importance of risk factors and advances in medical technology are thus both key driving factors of the second stage of the health transition, not unlike the role of Pasteur's discoveries and antibiotics in the first stage. These conditions only emerged at a relatively late stage in the history of developed countries. It was only when infectious diseases were largely eradicated that attention could focus on degenerative diseases and a high level of economic and social development could be reached to access the necessary material and cultural resources. In most developing countries, the conditions required to achieve such progress began to emerge in the 1970s, enabling life expectancy to rise above 75. However, not all developed countries were able to create these conditions. Eastern European countries continue to be affected by the combined effects of the disadvantages of the third stage of Omran's model – i.e. degenerative diseases and the spread of diseases of affluence. After developed countries, the developing world is now in the midst of the health transition, although not all countries are at the same stage of the transition, with sub-Saharan Africa lagging far behind.

2.2 The Health Transition in Developing Countries

Though initially limited to Europe and North America, the significant increase in life expectancy, linked to the fight against infectious diseases, spread rapidly to the rest of the world in the twentieth century. It was essentially after World War II that Southern countries began to benefit, although the level of progress varied widely. Until the 1970s, it was widely believed that the least advanced countries, where progress was more rapid, would eventually catch up with other countries, and that the life expectancy in different countries of the world would converge. However, this convergence has been undermined in recent decades. In some developing countries, for the most part in sub-Saharan Africa, life expectancy has increased more slowly, leaving health progress trailing. Mortality has even increased dramatically in some of these countries as a result of the AIDS epidemic.

2.2.1 The Health Transition in Southern Countries: Wide Variations

The health transition follows the path of innovation, and initially affects societies open to the outside world. Today, the health transition is at an advanced stage in Latin America and the Caribbean. In Asia, the situation is more varied, with some countries where progress has been rapid (Taiwan, Hong-Kong, Singapore, Korea and China) and South Asian countries where progress has been much slower (India, Bangladesh). Africa is currently lagging far behind.

The decline of mortality is a multifactorial process. The medical techniques (fight against smallpox or other infectious and parasitic diseases) developed by developed countries have played a determining role in some poor countries (Sri Lanka, Cuba, Costa Rica, Kerala) and in China, enabling them in the 1970s and 1980s to reach life expectancy levels close to those of rich countries without any major economic development. After World War II, it was widely thought that it was enough to introduce eradication campaigns targeting the main endemics. There have been major successes, the most well-known of which is the almost entire eradication of malaria in Sri Lanka, resulting in an increase in life expectancy of 12 years between 1946 and 1948. However, it soon became apparent that health progress would only be sustainably generalized if the diffusion of medical technologies was supported by effective health policies taking into account the multiple factors of progress and ensuring maximum access. At the Alma-Ata conference in 1978, the WHO adopted the strategy of 'primary health care', which involved not only diffusing a whole range of simple and effective medical techniques at a local level, but also the development of food-producing industries, the supply of drinking water, environmental sanitation, and, even more importantly, educational progress and the improvement of the status of women.

The primary health care strategy has been criticized for rarely delivering on its promises. Its implementation has encountered many difficulties in practice. The introduction of primary health care has been impeded by a range of factors – not least because of the cost of primary care in countries where the target population is the large majority of the population. There has also been significant resistance (if only passive) to any major redeployment of existing resources. Most governments have adopted health policies based on the primary care approach, although the implementation of these policies has been limited and has almost never resulted in the major policy overhaul required to achieve the anticipated results. Yet it is precisely by retaining qualified health professionals that Costa Rica, Kenya and the Indian State of Kerala (not to mention China) have been able to improve their life expectancy well beyond what might have been expected based on their level of economic development. In its 2008 report on health in the world, the WHO reaffirmed the importance of reforming health systems to ensure that they provide primary health care services. Infectious and parasitic diseases have, nonetheless, declined all throughout the world.

Although the health transition has occurred later in developing countries compared to developed countries, and although developing countries continue to be

heavily affected by infectious and parasitic diseases, these countries have already seen an increase in social diseases. Contrary to widespread belief, chronic diseases are not only the product of development and wealth, since 79 % of the global number of deaths caused by chronic diseases (cardiovascular diseases and cancer) occur in developing countries. These 'diseases of affluence' could become the leading causes of deaths in the poorest countries of the world, where alcohol use (particularly beer) and smoking are becoming increasingly widespread.

This trend, which is expected to continue in the years ahead, is largely related to changes in lifestyle, particularly urbanization, which has a profound impact on eating habits, social and economic activities and social structures. After occurring relatively slowly in developed regions, these changes have been much faster in developing countries. Increasingly sedentary lifestyles, decreased physical activity and high-calorie diets, in addition to excessive drinking and smoking and the stress of urban living, have contributed to the rise in chronic diseases. Cardiovascular diseases have become widespread in almost all of the poorest countries of the world, and their impact is expected to increase in the years to come, if only as a result of population ageing. One major concern is the relatively young age at which people in developing countries die of cardiovascular diseases compared to developed regions. In poor and transition countries, the suddenness of the changes have meant that excess weight and obesity now coexist with malnutrition, sometimes even the same social environment, or even the same family.

Over the last 50 years, life expectancy at birth has increased three times faster in developing countries than in developed countries, causing the gap between developed and developing countries to narrow. However, over the last two decades, the gap between different countries within the developing world has widened. While some countries have made as much progress over the last 30 years as developed countries did over a century, others have lagged behind. The most significant trend is the convergence between southern and northern countries. In the years 1950–1955, life expectancy in most underdeveloped countries was between 35 and 45 years, far behind the majority of developed countries (around 65–70). In 1970–1975, most developed countries had similar levels of life expectancy (with 5 years difference at most), while the situation of poor countries suddenly became increasingly diverse, with the life expectancy of significant proportions of the population tending toward the life expectancy of rich countries. In 1995–2000, the change was even more pronounced: many developing countries now had life expectancies around 65–70, close to the life expectancy of most developed countries, despite the fact the populations of developing countries gained 5 years of life expectancy over the same period. Sub-Saharan Africa is currently lagging far behind other developing regions.

2.2.2 Sub-Saharan Africa Lagging Behind

Progress has been slower in sub-Saharan Africa than in any other region, and infectious and parasitic diseases continue to the most significant health issues in this

region, particularly among youngest members of the population. Unlike developed countries, countries in sub-Saharan Africa are thus affected by all types of pathologies – i.e. the pathologies of the first age of the health transition and chronic diseases, resulting in a double morbidity burden.

There is not a single country in sub-Saharan Africa that has been able to follow the same trend as developing countries, including those with similar or higher levels of life expectancy as North African countries in 1950 (Mesle and Vallin 2003). Trends in the sub-Saharan region vary widely. Some countries (Sudan, Senegal, and Mali, or, with a lower starting point, Niger and Guinea) made regular and consistent progress over the entire period, although at a slower rate than the average of developing countries. Many other countries that had followed the same trend until the late 1980s have since seen no further improvements, and, in some cases, have even seen a decline in life expectancy. These include Ghana, Tanzania, Cameroon, Nigeria, and Angola (among others). Another group includes countries that have seen a reversal over the last two decades – moderate in some cases (Côte d'Ivoire, Central African Republic and Burkina Faso), more recent (and therefore impossible to assess) in other countries (South Africa, Lesotho, and Kenya), and very significant in another group of countries (Botswana, Zimbabwe, Namibia and Zambia). Lastly, some countries have seen no increase in life expectancy as a result of war or political violence.

It is not merely that Africa entered the demographic transition at a later stage, but that in some countries progress slowed as early as the 1970s, with some countries even seeing a decline in life expectancy. Even in countries (Senegal, Sudan, Mali, and Benin) that have seen a consistent rise in life expectancy since the 1950s, progress has much slower than the average rate of progress in developing countries. In all countries, the level of life expectancy is heavily dependent on the level of infant mortality, itself determined by the impact of infectious and parasitic diseases, which are still rife. In the 1970s, the health situation deteriorated in many countries faced with a new outbreak of new epidemics (cholera, viral hemorrhagic fevers such as Ebola, resistance to antimalarial drugs), the increased incidence of 'hunger diseases', the extension of periods of drought, and the increasing number of wars. Far from narrowing, the gap with developed countries has thus increased. For example, Nigeria, which had the same level of life expectancy as Tunisia around 1950, has been severely affected by negative trends, and its current life expectancy is below 27.

In addition to these factors, a number of sub-Saharan African countries have experienced a stagnation (and in some cases an increase) in adult and child mortality. These include the countries most affected by the AIDS epidemic (starting in the 1980s), such as Uganda, Zambia and Zimbabwe. In the most extreme cases, life expectancy has plummeted. For example, in Zambia, life expectancy dropped by 11 years between 1980s–1985 and 1995–2000, and has returned to the same level as the 1950s (43). Over the same period, life expectancy in Zimbabwe dropped by almost 17 years, and like expectancy is now below 40 (compared to 47 in the early 1950s). According to United Nations estimates, between the highest observed level and the lowest estimated or predicted level, South Africa risks losing 18 years of life expectancy, Lesotho over 21 years and Botswana over 26 years. Although Southern and Eastern Africa are the most affected regions, no region of sub-Saharan Africa is

entirely spared. AIDS appears to be the most violent factor undermining the health transition in Africa, causing some countries to return to life expectancy levels characteristic of the second stage of the epidemiological transition (based on Omran's model). In countries where the AIDS epidemic has appeared more recently, its future impact is likely to be far more significant than anything suggested by the available data. Once the epidemic is curbed, the United Nations predict a resumption that could be much faster than the rate of progress before the shock.

However, AIDS is not the only factor affecting Africa's delayed progress. Other major factors include wars and political violence, which are unfortunately not uncommon in Africa, notably in Mozambique, Ethiopia, Rwanda, Sierra Leone, Liberia, Eritrea, Somalia, Angola, and the Democratic Republic of Congo (among others). Data are often lacking, although it is estimated that in some countries (such as Rwanda), the impact on life expectancy could potentially be as great as the effect of AIDS. Once again, Africa is currently struggling to emerge from a cause of death that is characteristic of the first and second phases/stages of the health transition. The economic crisis of the 1980s–1990s probably had an impact on life expectancy, although though it has been less apparent. A systematic analysis of infant and child mortality trends based on demographic and health surveys (DHS) and compared with macroeconomic data, carried out in the 1990s, showed no relationship between the two (Barbieri and Vallin 1996). The likely implication is not that there was no relationship, but that we lacked the historical perspective to identify/detect/find it. Today, the analysis of the relationship is even more complicated because of the scale of the AIDS epidemic.

Despite the early successes in the fight against infectious diseases (particularly tropical diseases), sub-Saharan Africa has continued to lag behind other regions as a result of the lack of progress since the 1950s and the sudden reversal as a result of the AIDS epidemic. Sub-Saharan is far from having completed the second stage of Omran's epidemiological transition. In 2010, very few countries had a life expectancy below 50, but all those that did were in sub-Saharan Africa (United Nations).

2.3 Conclusion

The health transition is an integral part of the demographic process in developing countries. After developed countries, developing countries entered the demographic transition as a result of the decline of mortality, leading in turn to a decline in natural population growth after the decline in the birth rate.

As defined by Abdel Omran in 1971, the health transition, driven primarily by mortality trends, is based on a structural change in the causes of death. The assumption is that the decline of mortality is accompanied by a replacement of pandemic diseases by degenerative diseases or stress and lifestyle diseases. The average age at death has shifted from infancy to childhood and youth to the most advanced ages, with an increase in life expectancy. The health transition has also involved a shift from a population health profile dominated by mortality to a profile dominated by morbidity.

These changes began in the eighteenth century, before eventually reaching all countries, albeit at different rates. However, developing countries have yet to catch up with developed countries. The health transition is well underway in Latin America and Asia. By contrast, there has been little headway in sub-Saharan Africa, where progress has been slower than anywhere else, in a region still heavily affected by infectious and parasitic diseases, particularly among the youngest members of the population. Since the 1980s, the AIDS epidemic has caused a reversal in life expectancy in some countries. Unlike developed countries, many developing countries thus combine all types of pathologies: those characteristic of the first stage of the demographic transition, but also AIDS and chronic diseases, causing a double morbidity burden to weigh on the population.

Recent mortality trends (decline and even stagnation in some regions) have highlighted the determining role of the socioeconomic and political context in the promotion of population health. Researchers have considered the issue of how to pursue the improvement of population health without a certain level of economic and social development. Demographers, epidemiologists, sociologists and economists have raised new questions on health, focusing not only on changes in morbidity linked to the epidemiological transition, but also the response of society to health conditions through the health system (Loenzien 2002).

Chapter 3
Measuring Population Health

The need to measure population is health linked to what Kue Young neatly summarized in four words: 'describe, explain, predict, control'. The assumption is that studies of population health provide a useful basis for describing the state of health, identifying the causes of diseases, predicting risks and providing solutions to prevent and control health problems (Sermet and Cambois 2005). A detailed knowledge of population health enables governments to determine how best to use the available resources and can be used by the health authorities to inform government decisions and provide data to researchers. Information on population health is also useful for meeting the public's demand for health information. Predicting future health is also key to planning health policies, which often involve significant resources.

The WHO lists eight uses of morbidity data: control of infectious diseases, planning prevention programs, determining the relationships between morbidity and social factors, allocating resources for effective care, estimating the economic burden of disease, researching the etiology and pathogenesis of diseases, assessing the effectiveness of preventive and therapeutic measures, and conducting national and international studies on the distribution of disease and disability (Basch 1990).

In this sense, there is no single indicator for measuring population health. Two other factors need to be taken into account: first, the different components of morbidity and their definition, and second the needs of users. In order to assess progress toward the objective of 'Health for all by 2000', the WHO asked member states to provide a series of indicators, including life expectancy at birth, the infant mortality rate, the proportion of the population aged 65 and over, the share of GDP spent on health care, and the number of cases of AIDS, polio, and measles.

The indicators used to measure population health are based on negative indicators for the assessment of diseases and their impact on health. As such, health statistics provide data on the number and causes of death, disease, and disability of different types and sources: vital statistics, medical causes of death, notifiable communicable diseases, records of disease, hospital morbidity databases and population surveys. The available data will first be presented before examining the different indicators used to assess population health.

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3.1 The Available Data

The required data include data on morbidity and mortality, although the most important objective is to determine the demographic characteristics of populations. Reliable data at a sufficiently detailed nosological, temporal, geographical and social level are also required. However, while the international statistical system is in principle designed to provide demographic and mortality data by age groups and gender in the 192 member states of the United Nations, there is no equivalent regulation or guideline for data collection on morbidity or risk factors.

Ideally, data should be collected either on the whole population or on representative samples (i.e. randomly selected, possibly using cluster sampling methods, popular among demographers). Unfortunately, the available data are all too often based on non-representative samples, sometimes determined by convenience of access or the vagaries of research funding. The social and geographical unit in which health data are most relevant is not necessarily a country but a region, and/or an ethnic group or social class, and data in these areas are rarely available in developing countries. Nosology (the classification of diseases) is very difficult to determine. Since patients in developing countries are often affected by multiple pathologies, there can be almost insurmountable coding difficulties (Valleron 2008).

3.1.1 Demographic Data

'A knowledge of the current and projected demographics of countries is indispensable for measuring the burden of diseases: cancer-related mortality rates in developed and developing countries cannot be compared without taking into account the very different age structures of developed and developing countries. Likewise, no projections can be made without taking into account demographic changes, most of which are already largely predictable' (Valleron 2008: 993).

In many developing countries, reliable demographic data remain a rarity. Even today, we still have only a very limited understanding of the size of many populations and of their distribution in the different age groups, between rural and urban areas, and a fortiori between different income groups. Data quality is proportional to the level of development, and the countries affected by lack of data are mainly in sub-Saharan Africa. Most of the figures used are derived from indirect estimates based on demographic models, some of which are highly sophisticated.

Although countries in these areas conduct population surveys, these are not carried out on a regular basis. The difficulties raised by inadequate administrative and statistical systems, the cost of census-taking, the insufficient numbers and inadequate training of pollsters, and a range of sociocultural obstacles are sometimes difficult to overcome. Africa is particularly affected by these problems. Some countries only undertook their first census in the 1980s, while others have not conducted a census since the 1980s. For example, in Angola, the last census was conducted in 1970. Even when censuses are conducted, they are not always of a high enough

standard and the results are sometimes unreliable, with a margin of error of 10 % (or more in some cases). Estimates of population size are generally driven by political rather than health objectives – i.e. determining population figures, determining voting weights, levying taxes, or allocating budgets. All of these factors are conducive to fraud and omission. Nigeria is a good example (Omoluabi and Lery 1992). In 1991, the United Nations estimated the population of Nigeria at 122.5 million inhabitants and predicted that the population would reach 305 million by 2025. In November of the same year, the census identified 88.5 million people. The latest United Nations estimates (2009a) indicated 152.6 million, with a projected population of 285 million by 2050. However, several African states have conducted censuses in recent years, including Cameroon (2005), Burkina Faso (2006), Nigeria (2006), Libya (2006), Morocco (2006), the Republic of Congo (2007), and Mali (2009). Birth and death records are also often incomplete, particularly in rural areas, where the trend is significant. In Madagascar, despite the existence of a vital statistics system since 1878, only some demographic events (births and deaths) are included. Countries affected by conflict also have inadequate data.

The lack of demographic data is a major obstacle to the development of effective policies and programs to improve the health of the most vulnerable in society. In recent decades, the need for reliable databases has led to the creation of an increasing number of field research sites equipped with demographic surveillance systems (DSS) in various regions of the developing world where data collection tools were previously poor and even nonexistent. Today, a network of 29 demographic surveillance systems across Africa and Asia[1] ensure a constant monitoring of the populations of well-defined geographical area. A DDS is based on an initial census aimed at defining and recording the reference population. It is regularly updated based on additional surveys, providing an indication of the demographic dynamics of the population by births, deaths and migrations and generating longitudinal data on demographics and health collected among the population. The data collected in the sites covered by a DDS are often controversial since they are based on small populations – a factor suggesting that measures of mortality are neither accurate nor representative. However, the small size of a population covered by a DDS (a few tens of thousands of people) has some advantages, since the resulting data are high in quality in terms of coverage, completeness and accuracy of reported ages at death, and can also produce good estimates of mortality by age if the data are collected over several years. Data collected over long periods among populations living in the same region can also provide useful information on the risk of death by age. When the data derived from several dispersed sites are grouped together, they provide representative (geographical and historical) estimates of mortality conditions. Currently, only sites covered by a DDS provide useful data for determining the temporal and geographic characteristics of mortality profiles in Africa (INDEPTH Network 2003).

[1] Mali, Senegal, Gambia, Guinea-Bissau, Burkina-Faso, Ghana, Ethiopia, Tanzania, Zambia, Mozambique, South Africa, Bangladesh, Vietnam.

3.1.2 Mortality Data

For many years, demographers examined health in terms of the impact on life (mortality, cause of death, life expectancy, etc.), the study of the social determinants of health, or the study of the epidemiological history of populations. Mortality – which is clearly directly linked to health – is one of the major foci of demographic research, an area examined by demographers even before the term 'demography' was even coined. 'In purely medical terms, death is […] the result of a shorter or longer process of failing energy leading from health [insofar as there is such a thing as perfect health] through the various manifestations of morbidity – acute or chronic diseases, accidents, and other forms of violence – to the medical causes of death' (Cazelli et al. 2005: 4).

The object of mortality research is not death so much as deaths, i.e. events construed as instantaneous, belonging to the past (in the sense of being completed), and viewed as manifestations of a fatal phenomenon from which individuals are singularly absent. Studies on mortality based on the medical cause of death are closer to the reality of death but suffer from the same limitations as research on general mortality, since both approaches only focus on individuals viewed as isolated entities in a social space in which they have no other relationships but a national, socio-professional, regional or other affiliation (Monnier and Pennec 2005).

From the earliest essays on the causes of death to the highly sophisticated statistical systems of developed countries, the aim has always been to identify causes that can be prevented or cured.

The Causes of Death

The earliest experiments in data collection aimed at identifying the causes of death were designed as part of the fight against epidemics. For example, the records of the causes of death used by John Graunt were introduced in London after the plague epidemic of 1592. Following the example of Graunt, the first mortality tables by cause appeared in Europe in the eighteenth century. In France, the first mortality table by cause was published in 1767 by Jean Razoux based on the deaths recorded at the Hôtel-Dieu in Nîmes over 5 years. In 1776, in response to a survey carried out by the Société Royale de Médecine to observe epidemics, many doctors provided statistical tables (Mesle 2005). The nineteenth century saw the development throughout Europe of the first systematic records of deaths by cause, and, by the beginning the twentieth century, the principle of national records of death by cause was definitively established in many European countries. Most of the changes carried out since then have been of a qualitative nature. Medical death certificates have become standard practice in Europe. The WHO provides a standard death certificate model used by many countries, enabling doctors to report several contributing causes and to provide a better picture of the sequence of pathological processes.

Despite becoming standard practice in developed countries, cause-specific mortality statistics are uncommon in most developing countries. In developing countries, the deficiencies of vital statistics have been remedied by developing survey methods enabling non-physicians to collect information on the circumstances of death from relatives of the deceased. The method is known as the verbal autopsy method.

In order to be of use, information on the cause of death must be classified. Until the eighteenth century, the adopted classification was alphabetical. At the 1853 International Statistical Congress, a first attempt was made to develop a common classification. However, the proposed classification was never used, with each country involved in the development of the classification choosing to retain its own system. In 1891, Jacques Bertillon, head of the Paris statistics service, was entrusted with the task of establishing a new international classification of the causes of death. The new classification adopted in 1893 was hugely successful. The international classification of diseases (ICD) provides a standardized coding of the causes of death. The ICD contains 14 divisions, including 203 rubrics with a precise content. The ICD system is regularly updated. The first revision was carried out in 1900. To date, there have been 11 revisions (CIM-11). Today, all countries with regularly updated cause-specific mortality statistics use the ICD. The changes made to the ICD have been relatively minor. In 1948, the WHO developed a more precise international death certificate model and specified that the 'initial' cause of death must be provided to enable the production of statistics on cause-specific mortality rates. In 1977, the WHO completed the system with a perinatal death certificate model.

Several issues need to be considered. First, the coding of death certificates is not as easy as it may seem. The person responsible for filling out a death certificate may not have the required knowledge or skills to make the distinction between the initial and main cause or between immediate and associated causes, particularly in the case of vulnerable people exposed at any one time to many risks. In many countries, the three categories of causes of death are carefully coded and complex algorithms can be used, in principle, to ensure data coherence. However, the main difficulty is not the coding but the complexity of the very notion of cause. The UN requires countries to provide exhaustive demographic data, and in particular data on deaths. Mortality data are based on death certificates that must be standardized across the globe, including, if possible, a validation by a doctor or, failing that, by a qualified health professional. Today, ministries of health in all countries have medical statistics departments in charge of publishing the main causes of death, based generally on the ICD or on variants adapted to local conditions.

Observing the Causes of Death in Developing Countries: The Verbal Autopsy Method

In developing countries, the determination of the cause of death is a difficult matter since the majority of deaths occur outside any medical institutional setting and vital statistics are largely unreliable. Among the methods that have been developed in

this area, the 'verbal autopsy' method[2] is the most widely used, particularly on samples in the context of Demographic and Health Surveys (DHS). In 1956, Yves Biraud published the first study calling for the use of the information provided by relatives of the deceased to determine the cause of death (Biraud 1961). The first demographic studies aimed at collecting information on the causes of death were carried out in Khanna in Northern India in 1955–1960 (Wyon and Gordon) and in Companiganj in Bangladesh, in the years 1975–1978 (Chowdhury and Khan). In 1978, the WHO published lists of the causes of death for use by non-doctors working in developing countries. Several other researchers have worked on these questions in major research centers working on longitudinal population studies involving demographers and doctors, for example in Matlab in Bangladesh (Zimicki et al., D'Souza), Niakhar in Senegal (Garenne and Fontaine), Kenya (Omandi-Odhiambo et al.), and Gambia (Lamb et al.).

The first international seminar organized to discuss the verbal autopsy method was held in 1989 in Baltimore. For the first time, researchers discussed the question of multiple causes of death and the issue of expressing verbal autopsies as algorithms, particularly in the area of infant mortality. In 1994, the WHO held a second seminar at the London School of Hygiene and Tropical Medicine, focusing in particular on the use of verbal autopsies to determine the causes of death among women, and in particular maternal deaths. The verbal autopsy method is now widely used.

Fauveau (2005) defined the concept of verbal autopsy, a term used for the first time by Arnold Kielmann in 1983 in his work in the Punjab, as 'a technique of using the information acquired from a recently deceased person's entourage to reconstruct the events and the symptoms that preceded the death so as to deduct a medically acceptable cause or causes of death' (Fauveau 2005: 47). This definition contains its own limitations, particularly in terms of validity or official recognition and the issue of medically acceptable information, but serves to compensate for the absence of medical certificates in regions where certification is lacking.

The first stage involves identifying and recording all of the deaths that occurred over the studied period in the examined age group with the date and place of death and the sex, age (or date of birth where known), identity and address of the deceased. Since it requires no medical knowledge, this task can be carried out by an agent of the demographic surveillance system or vital statistics agency. It is important not to focus solely on deaths that occurred in a hospital setting, which, since they are not representative of all deaths, represent a biased group. The collected information is then transmitted to a health agent, who will be required to interview the family or friends of the deceased (within 1–3 months of death) on the circumstances of death. The interview involves two stages: first, the family is asked to provide their own account of the disease, focusing in particular on the chronology of events; second, the most important details of the observed symptoms are re-examined. To obtain more accurate answers, the interview must be conducted in the presence of two or

[2]The verbal autopsy method has been described in detail by Vincent Fauveau in his work on cause-specific mortality in Bangladesh.

three people who witnessed the development of the disease. The agent will need to have an in-depth knowledge of the local pathology and of vernacular terms and explanations, but is not required to establish a diagnosis.

The reported facts are then interpreted by a public health doctor or by an experienced nurse well-versed in the interpretation of local symptoms in order to determine the causes of death. The doctor (or nurse) begins by identifying the main cause of the disease or the chain of events leading to death, before determining the immediate cause that directly caused death and finally the associated cause (or causes) that did not cause death but that may have contributed to the chain of events leading to death. The health agent then relates the identified causes with the causes found on the pre-established lists provided by the public health authorities. To ensure greater rigor, the document is then given to three doctors, who reach independent conclusions, while a fourth doctor is entrusted with comparing the diagnoses based on the simple majority rule. If the information is insufficient to determine the causes of death, the agent revisits the family to collect additional information.

The cause of death is then coded and classified based on one of the many existing classification systems. The list provided in the ICD cannot be directly used for verbal autopsies since it is too complex and detailed and is too often based on a precise medical diagnosis, with anatomic-pathology information playing a key part. However, it can be useful to refer to the ICD for broad categories (for example, respiratory diseases, diarrheic diseases, and accidents), and it is often necessary to add codes according to the specific combination of pathologies or causes often found at a local level. Vincent Fauveau referred to the example of a death attributed to a complication of measles, where three different codes can be used: one for a death due to an immediate neurological complication of measles (during the eruption), one for a death due to a late respiratory complication, and a third due to a late digestive complication (invasive diarrhea). In short, the cause of death can be classified as neurological, respiratory, digestive, or infectious (measles) according to the chosen emphasis.

Special procedures are recommended for certain categories of causes in three particular cases: deaths during the neonatal period, deaths caused by malnutrition, and maternal deaths. In the case of deaths during the neonatal period, the causes are often difficult to determine by verbal autopsy, particularly in regions where supernatural explanations are still widely used (magic, bad eye). In such cases, particular attention is given to the chronology of events leading up to the birth: for example, it is biologically almost impossible to die as a result of neonatal tetanus before the fourth day of life, and very rarely after the fourth week of life. The diagnosis of neonatal tetanus can be further refined by distinguishing it from neurological complications due to anorexia, obstetric trauma or other neonatal infections. In the case of malnutrition-related deaths among infants, except for a few cases of acute malnutrition, the symptoms appear gradually and are not quickly noticed by the mother. It is often only as a result of comments from members of the family or relatives who only see the child occasionally that the mother will become aware of the problem. The coding and classification of malnutrition differ according to whether malnutrition is viewed as an individual cause of death or an associated cause, which is both

more plausible and more useful from a public health point of view. For maternal mortality, it is advisable to entrust the verbal autopsy questionnaire to a female agent well-versed in local practices and beliefs and well-regarded among community members. To determine the contribution of the complications of an induced abortion, a sensitive questionnaire needs to be used, focusing in particular on menstruations, the awareness of a pregnancy in its early stages, the attitude and statements of the patients concerning her desire to complete the pregnancy, contraceptive methods and practices, social, economic or marital problems, etc.

Verbal autopsies have a wide range of applications. Their first use is to show the relative contribution of the main causes of death in a population, for a given age group, either on a relative basis by classifying them in order, or on an absolute basis, using cause-specific mortality rates. This may apply at a national level in the case of a representative sample, such as in a demographic and health survey, or in order to monitor trends over time relating to specific causes of death. According to Fauveau, the second advantage of the verbal autopsy method is that it helps to implement specific measures, such as the choice of an optimal age for a vaccination. Third, verbal autopsies can also be used to assess the impact of specific interventions to address the cause of death. In developing countries, the focus used to be limited to global mortality rates limited to specific age or gender groups – for example, infant or child mortality or deaths among women of childbearing age. However, it eventually became apparent that mortality rates needed to be refined by breaking down deaths by cause and by relating them to age and gender, under the pressure of international organizations and as part of the introduction of programs for the fight against epidemics or large endemics. Trials have been carried out to assess the effectiveness of measles or tetanus vaccination programs, programs for the reduction of maternal mortality and deaths caused by acute respiratory infections, and programs for the reduction of diarrhoea or malaria-related deaths. Verbal autopsies have also been used to define strategies to reduce abnormally high mortality rates among small girls in certain communities or to maximize the cost efficiency of a health program.

Researchers have raised a number of issues surrounding the verbal autopsy method. First, selection biases need to be avoided by ensuring that all deaths have been recorded and have been subject to the necessary investigations and by applying the method to representative samples. The interview of the family must be carried out as soon as possible after the death to ensure that the collected information is as accurate as possible. The agent in charge of the inquiry (during the mourning period) must show tact and must comply with the social and cultural customs of the local community. The wide range of agents involved in the collection of data requires standardizing interviews. Agents are advised to use standardized questionnaires and decision trees or algorithms, as is the case in the DHS. The International Classification of Diseases is too complex to be used. A simplified classification is generally adopted based on the symptoms observed, because of the nature of the collected information. The classification needs to be based on etiology because of its potential use for public health. However, to date, no standardized and simplified classification has been adapted to the verbal autopsy method. The standardization of WHO

guidelines to code a main cause, an immediate cause and an associated cause remains incomplete and the comparability of results remains open to doubt.

Several broad categories of causes raise specific coding issues, such as violent injuries or causes of death, diabetes, alcoholism, malnutrition, and AIDS. It has also often been recommended in public health to consider the sociobehavioral causes of death in order to determine the avoidable factors by non-exclusively health approaches, such as contraceptive failure, illegal abortion, or refusal of treatment. Simple cases where the cause of death is indisputable are very rare. Cases of pathologies with non-specific symptoms are more frequent, where only a range of indicators can be used, as with malaria or AIDS. The symptoms of pernicious malaria are often impossible to distinguish from the symptoms of meningitis, except in the case of a typical epidemic. In the case of AIDS, where patients generally die as a result of infectious and often multiple complications, a range of criteria are used to establish a diagnosis, such as belonging to a high-risk group (young people, sex workers) or the presence of characteristic symptoms (cough or recurrent diarrhoea, weight loss, etc.). The task of objectively validating the results raises the issue of the reference standard. The results can only be validated by comparing the results of the verbal autopsy with the results of a medical certificate written by qualified doctors based on complete medical files. The proportion of causes that cannot be determined varies in different studies. When it is above 20 %, the interpretation of the results is undermined.

The Coverage of the Population

The coverage of deaths is far from complete and the quality of coding of the causes of death is generally poor, even in developed countries.

In 2005, Mathers et al. provided an overview of the state of mortality data collection at a global level in the WHO report. Out of 192 countries:

- No information on mortality was available for 39 countries (including 25 of the 46 countries of the WHO African region);
- Death statistics before 1990 were lacking in 75 countries (including 42 of the 49 countries of the African region, 7 countries of the Southeast Asia region, 10 of the 27 countries of the Western Pacific region, 12 of the 21 countries of the Mediterranean region, 2 of the 35 countries of the American region and 2 countries – Andorra and Monaco – of the Europe region).
- Of the 106 countries that provided mortality statistics to the WHO at least once since 1990, with at least a 50 % population coverage rate, just 23 countries were classified by the authors as having provided high-quality data (France was not one of them), while 28 countries were deemed to have provided poor-quality data (with less than 70 % coverage, or over 20 % of unknown causes).

Data quality is also often poor. The proportion of deaths by unknown causes is above 40 % in Sri Lanka and Thailand, compared to just 4 % in New Zealand. Deaths of unknown cause are distributed across the existing categories of the ICD based on estimates, a time-consuming process offering little hope of validation.

Given this state of affairs, some have questioned the demand for comprehensive mortality statistics and have called for the use of representative samples of deaths rather than comprehensive data on all deaths. Two large countries (China and India) have already started to use representative sampling methods, providing usable data.

Mortality rates are currently measured using the available data, which are often sparse. Missing data are estimated using incomplete but reliable data based on indirect methods. The level of infant and child mortality can be estimated by interviewing women about their dead children in the 5 years before a survey, before estimating the general mortality rate based on life tables. Another method involves using a regression equation to estimate the adult mortality rate based on child mortality, for which the data are more complete. The equation is established based on countries for which both data sets are available and is used to estimate adult mortality when data are incomplete.

3.1.3 Morbidity Data

Unlike mortality, the measurement of morbidity comes up against the problem of the definition of morbidity in different populations and the type of morbidity. In Chap. 1, we saw that the concept of disease varies in different societies and may cover different realities according to whether estimates use self-reported morbidity, diagnosed morbidity or objective morbidity. The measurement of morbidity therefore raises more problems than the measurement of mortality. Epidemiologists were the first to focus on an approach to morbidity aimed primarily at measuring the frequency of diseases, their etiology and prevention, and the evaluation of the treatments designed to combat them. Epidemiology can be used to quantify the relationships between diseases and the characteristics of individuals and their environment and to quantify the impact of certain factors or interventions on the health of individuals. Epidemiology relates diseases to the individual, environmental, and social factors influencing the frequency, distribution, and evolution of diseases. In short, epidemiology defines the biological and environmental determinants of disease.

Data availability is a crucial issue. Information systems are used to obtain representative data. The estimation of morbidity involves numerous studies of varying quality, and morbid states are difficult to categorize. In addition, the estimation of morbidity is not supported by the international regulatory and organizational framework governing mortality data collection.

Developed countries have the most reliable data, although even in these countries morbidity as a whole is not covered. Many countries record the type and number of diseases diagnosed and treated by the medical community among patients who consulted a doctor. Data sources include chronic disease registers (e.g. cancer), hospital statistics, and work-related diseases and accidents. Some developed countries have a long history of rigorous epidemiological surveillance programs (an example to be followed). Examples include the SEER program (Surveillance, Epidemiology and End Results) in the United States, which collects data on representative samples covering

10 % of the U.S. population. Some countries conduct large-scale demographic health surveys supported by a medical examination of part of the sample. The NHES (National Health Examination Survey) was one of the first surveys of this kind to be introduced in the United States (in the 1960s). The survey initially focused on people aged 18–79 years and a limited number of diseases. However, it has since been extended (National Health and Nutrition Examination Survey, or NHANES) and has been carried out repeatedly since 1974. Similar surveys are also carried out in Canada and in a number of European countries (Finland, Germany, Spain, United Kingdom). Conducting these studies at a national level is a complex process and only some diseases (such as arterial hypertension and diabetes) can be easily measured. In short, surveys of this kind, which include a medical examination component, are limited to the study of a particular pathology, such as cardiovascular diseases, osteoporosis or cancer. Other surveys are conducted among the general population and only collect self-reported morbidity data (these are known simply as 'health surveys'). Many countries throughout the world conduct this type of survey, including 40 in Europe alone (according to the European Commission).

In the case of notifiable diseases, registries are used to monitor new cases. However, registries do not lend themselves well to analysis since they are often not in the form of files and are not updated as deaths or recoveries occur. In addition, comparisons with statistics relating to the medical cause of death, which provide no indication about the date at which the disease was diagnosed and reported, cannot be used as a basis for an analysis of the length and lethality of the disease.

In developed countries, health data tend to focus on national public health priorities – i.e. chronic diseases such as cancer, cardiovascular diseases, and diabetes. However, as a result of international cooperation, data on chronic diseases are gradually emerging from developing countries. In the case of cancer, it is estimated that in 1990, just 5 % of the population of developing countries was covered by cancer registries, compared to 64 % in developed countries (Valleron 2008). Data on the incidence of cancer are available for roughly 50 countries. In the case of other countries, indirect morbidity estimates are carried out using mortality data. As such, the data on incidence are often poor in quality and incomplete, even those relating to a disease such as cancer, let alone the data on infectious diseases such as malaria, leishmaniasis and even AIDS, which mostly occur in countries with no information system and where the causes of death are rarely or poorly coded and where registries and surveys based on representative samples are an exception, including in the case of HIV.

In many countries, demographic and health surveys (DHS) also provide morbidity data of recognized quality. DHS surveys primarily focus on adult and child populations and provide data on reproductive health, nutrition, malaria and the impact of AIDS. The generated information may not necessarily involve data on diseases, but observations on access to prevention and treatment (for example, in the case of malaria, data on the use of impregnated mosquito nets in high prevalence areas).

Global morbidity is often measured using indirect estimates based on multiple data sources. The international team involved in the 'Global Burden of Diseases' (GBD) project, coordinated by the WHO, has carried out a wide-scale program

aimed at bringing together dispersed databases. In 1992, the World Bank commissioned the first 'Global Burden of Diseases' study to obtain a comprehensive assessment of the burden of disease reported in 1990. The GBD study provided estimates of the incidence, prevalence, severity and duration of 136 diseases and their after-effects (over 500). The data used included over 8,700 different sources, 7,000 of which related to communicable diseases, maternal and child health and nutrition and a quarter of which related to populations of sub-Saharan Africa (Valleron 2008; Lopez et al. 2006). The GBD study showed that almost all health data sources can provide useful data provided they are controlled for reliability and completeness. The GBD has become a vital tool for measuring the global burden of disease, providing a basis for coherent estimates of the global descriptive epidemiology of major diseases.

3.2 Measurement Indicators

Rates and ratios are the indicators most commonly used to measure mortality and morbidity. A rate refers to the frequency of events that occur in a given population. In general, the term 'ratio' is preferable to 'rate' when the measure is not designed to link events to an at-risk population. A ratio involves a numerator and a denominator that are linked.

3.2.1 Indicators of Mortality

Mortality is measured by the number of deaths in a reference population. The crude death rate is the ratio between the number of deaths recorded over a given period and the total population. The CDR is usually calculated over a period of a year and the population in the denominator is the midyear population, calculated by an arithmetic mean of the size of the population at the beginning of the year and the end of the year (or at the beginning of the next year). The rate is generally expressed per 1,000 population, indicating the number of deaths per 1,000 population over the course of a year.

Since exposure to the risk of death varies widely according to age and gender, preference is generally given to specific rates such as rates by age or by age groups for each sex separately. The rate is based on the ratio between the number of deaths of the age group over a year and the total population of this age group half way through the year. Five-year age groups are often used. Some ages groups or categories of population receive particular attention, notably children (see Chap. 4) and women of childbearing age (Chap. 5). The same rates are used to measure cause-specific mortality rates. It is a simple measure that has the advantage of being additive: the sum of cause-specific mortality rates is equal to the all-cause mortality rate. Since it is an additive measure, the contribution of each cause can also be measured.

Because of differences in age structure, crude death rates are not suitable for comparing the populations of several countries over time and in space. More accurate indicators are used, including comparative and standardized rates and life expectancy. The standardized mortality rate is a death rate recalculated based on a standard population in terms of age structure. The standard population is generally defined by the WHO. However, the comparative mortality rate is not an absolute measure of mortality. According to the selected reference population, based on the same initial age-specific rates, the value of comparative rates can vary. In a young population, the ages at which mortality is low will have more weight, and vice versa.

Life expectancy at birth is a cyclical indicator providing a picture of mortality at a given point in time. Thus, when life expectancy at birth is 50 in a given country, this does not mean that the children born that year will live on average until 50. The individuals in question will live longer if there is an increase in socio-economic development, if access to treatment improves, and if the health system is improved. Conversely, they will live shorter lives if unexpected health events occur during their lifetime. Life tables by cause of death are based on the risk of death by age for a given cause. Inferences can be made about the median or average age at death for a given cause. The difference between life expectancy including all causes of death and life expectancy obtained by leaving out a particular cause of death provides a measure of the impact of a cause of death on life expectancy (Vallin et al. 1988).

Epidemiologists often use another indicator to provide estimates of mortality by cause – the years of life lost (YLL). The YLL measure quantifies the number of years lost due to premature death, i.e. a death occurring before a certain age defined as an 'ideal' age of death. The greater the tendency of deaths to occur at young ages, the greater the number of years of life lost. To determine the age limit, some authors have suggested using life expectancy as the reference age (Esteve et al. 1993) but to compare the results over time and in space, the highest life expectancy in the world (86 for women and 79 for men in Japan) can be used as the age limit. Years of life lost can be calculated by pathology since the YLL measure is an additive indicator.

The validity of an approach to health based on mortality indicators depends to a great extent on the link between the cause of death and the morbid process. Many diseases have no impact on mortality. With the development of health surveys, morbidity indicators have become increasingly significant.

3.2.2 Morbidity Indicators

Morbidity can be measured based on the number of diseased individuals, the number of cases of disease and the duration of these diseases. Several indicators are used to measure the burden of a disease in a given population: its prevalence, its incidence, and the mortality it causes. The prevalence of a disease is the number of diseased individuals at a given moment in time (absolute prevalence) or related to the size of the population or the population of the same age group (for example,

prevalence as the number of diseased individuals per million population). Incidence measures the number of new cases (or relapses) over a given period (generally a year) in a given population. The incidence of a disease is generally defined as the relative incidence (number of new cases per million population). New cases can be related to the total population or to the population of healthy (non-ill) people.

As with any stock measure, the level of morbidity at any given time in a given population depends on disease trends, including the number of new cases reported over the previous period (i.e. past incidence) and the length of the disease, which can lead to either recovery or death or remain chronic. The prevalence (P) of a disease is equal to the product of the incidence (I) by the average length of the disease (L) (in years, when incidence is expressed in cases per year): $P = I \times D$. Therefore, the prevalence of a disease varies according to its length, making the interpretation of variations difficult in terms of population health. The length of a disease generally depends on the applied treatments.[3] Diseases and pathologies can be characterized based on their level of severity, which can be measured by lethality, i.e. the number of deaths caused by a disease, in relation to the number of people who contracted the disease over a given period.

3.2.3 The Relationship Between Mortality and Morbidity

When mortality was largely due to infectious diseases, life tables were enough to monitor health trends, and the increase in life expectancy went hand in hand with the improvement of population health. Today, the reality is more complex. Chronic diseases have replaced infectious diseases and the risk of becoming ill is no longer solely related to the risk of dying. These changes require a particular focus on quality-adjusted life years and the resources required to measure the phenomenon. To measure disease-affected quality of life, epidemiologists and demographers have developed new indicators of life expectancy with and without chronic morbidity and with and without disability: the risk of disability is added to the risk of disease. Disability is both an indicator of disease severity and an indicator of the quality of years lived (Robine and Jagger 2005).

New indicators for the measurement of health status have been developed in recent years. Referred to generally as health expectancies, health status indicators are estimated in the same way as life expectancy but by taking into account the number of years spent living with disability. In this sense, health status indicators express the health status of an individual or population in terms of life expectancy. Among these indicators, there are two broad categories: health expectancies and health-adjusted life expectancies. Health expectancies measure the average number of years that an individual can hope to live in ‘good’ or ‘very good’ health, assuming

[3]For example, in 1985, a person infected with AIDS had a life expectancy of 2 years since there was no effective treatment. Today, AIDS patients can expect to live much longer when treated with antiretroviral drugs (Valleron 2008).

the current models of mortality and perceived morbidity remain unchanged. Health-adjusted life expectancy is a generic expression for all life expectancies weighted by the social value given to the different states of health in which years are lived (Robine et al. 2000). However, many countries have no data on the different aspects of morbid processes, particularly developing countries.

The number of years lost to disability (YLD) can be estimated using life expectancy indicators (Granados et al. 2005). The estimation process has been systematized and turned into a vital tool for measuring the global burden of disease by researchers involved in the WHO 'Global Burden of Disease' (GBD) program,[4] notably Christopher Murray, Alan Lopez, Colin Mathers, and Majid Ezzati. The YLD indicator is the result of a complex calculation in which the potential effects of diseases are weighted differently. For example, a year with unipolar depression is equivalent to 60 % of a year in good health. A correction factor is then applied according to age. In addition, in order to measure all the economic activities associated with well-being, researchers introduced a discount factor (generally 3 %) in the calculation of the indicator. A year of life lost in 30 years time does not have the same cost as a year lost next year.[5]

Since many injuries and diseases cause serious health problems without directly causing death, GBD researchers opted to combine different measurements of survival and the health of survivors in order to provide a unique measure of population health. The indicator takes into account both premature mortality (years of life lost) and years lost to disability (YLD). The sum of the two components, referred to as disability-adjusted life years (DALY), provides a measure of the total number of healthy years lost due to various diseases or conditions. The morbidity burden measures the gap between the current health situation and an ideal situation where every member of the population reaches old age without disease or disability.

A number of criticisms have been levelled at the DALY indicators (Lopez et al. 2006), among them the social choices relating to age-related weightings and the severity coefficients assigned to disabilities. By contrast, there have been very few criticisms about the uncertainty surrounding basic epidemiology, especially among populations in sub-Saharan Africa, which is likely to have a more significant impact on the identification of health priorities. These measurements represent major progress in the quantification of the impact of diseases, injuries and risk factors on population health at a global and regional level. Following the publication of the results of the first GBD study, several countries have begun to apply the methods used, forcing them to improve and broaden the collection of health data on which these analyses are based.

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[4]The GBD project involves a range of research projects and has become the key reference in the field. The project was launched in 1992 as part of a collaboration between the Harvard School of Public Health, which created the *Harvard University Initiative for Global Health*, the WHO and the World Bank. The results have appeared in books, reports, and publications in WHO reports and in major epidemiology and public health journals.

[5]The details of these calculations are explained in the handbook available on the WHO website at http://www.who.int/healthinfo/nationalburdenofdiseasemanual.pdf

3.3 Conclusion

Until the early 1960s, mortality rates were the main indicator of population health. However, with the increase in life expectancy, it became apparent that mortality rates were not enough to measure changes in health and health care. The development of health surveys provided a means of collecting many indicators on health, but also on environmental conditions, health care provision, biochemical or physiological measurements, and working days lost due to unfitness for work. The 1970s saw the emergence of synthetic indicators based in particular on a combination of mortality and data relating to the incidence or prevalence of diseases or based on quality-adjusted life years.

Beyond the mere presence or absence of disease at the heart of the traditional biomedical approach, health can be measured using perceptual, functional or adaptive approaches. In the functional approach, good health refers to the ability to perform a role or task and to perform all human activities. In the perceptual approach, good health implies notions such as well-being, taste for life and a fruitful or creative life. In the adaptive approach, good adaptation is indicative of a harmonious relationship with the environment (Sermet and Cambois 2005). With the increase in the proportion of elderly and very elderly people, recent demographic trends have generated an ever-increasing number of studies on functional health – issues that have become crucial for public health. The functional model examines health in terms of the impact of diseases, accidents or ageing on the ability of individuals to function effectively. The aim is to monitor changes in the burden of disability and dependence in a given population. Indicators of deficiency or functional disability have also been developed, ranging from the measurement of physical limitations to the inclusion of a far broader range of physical, social and psychological functions. Although they were initially developed in developed countries, these indicators are also increasingly being used in developing countries.

Chapter 4
Mortality in Developing Countries: Profound Changes

The level of mortality and its corollary, life expectancy, are good indicators of health in developing countries, since morbidity and mortality are closely related in these countries. While mortality has declined globally, life expectancy varies widely in different countries and regions. In developing countries, the level of mortality is marked by high levels of child, female and maternal mortality.

The most recent WHO report, published in 2010, estimated that around 58 million people died in 2009, including almost 9 million (15 %) children under 5 years. Mortality estimates are based on death statistics reported every year to the WHO. Where death records are unavailable or unreliable, household surveys and censuses are used to construct life tables based on the model developed by the WHO to generate mortality and life expectancy estimates. In developing countries, the number of deaths is particularly high in the adult population (15–59 year olds). According to the WHO, 30 % of deaths occur among adults, compared to just 20 % in developed countries. In developed countries, 60 % of deaths occur among people aged over 70 years, compared to just 30 % of deaths in developing countries. The significant number of premature deaths remains a major public health issue in developing countries. However, it is important to note that these averages conceal wide variations, since there are significant health inequalities in developing countries. There are also significant differences between countries with low mortality rates (such as China) and countries with high mortality rates (such as the majority of sub-Saharan African countries). In China, 10 % of deaths occur before the age of 5, compared to 40 % in Africa. In the population aged over 70 years, the percentage of deaths is 48 % in China and just 10 % in Africa.

4.1 The Decline of Mortality

Mortality has declined globally over the past centuries. Today, there are five times fewer deaths per 1,000 inhabitants compared to the eighteenth century, and the global mortality rate has declined from 40 to 8‰ (2011). These changes, which

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triggered the demographic transition (from the eighteenth and nineteenth centuries onwards in developed countries), occurred much later and much faster in developing regions. Recent mortality trends (decline or stagnation in some regions, decline of cardiovascular mortality in Western countries) have highlighted the key role of the socio-economic and political environment in the improvement of population health. The mortality transition initially concerns the youngest ages, before spreading to adults, and finally the most advanced ages.

4.1.1 Globally Rising Life Expectancy

The decline of mortality has resulted in a longer life expectancy, measured by life expectancy at birth. Life expectancy at birth is a synthetic indicator showing the level of mortality in a population at a given point in time, where the effect of age structure has been eliminated. Life expectancy at birth is defined as the average number of years that a new born can hope to live provided the mortality conditions (risk of death at each age) in the examined population remain unchanged throughout the life of an individual.

Today, life expectancy at birth is 69 years (67 for males and 71 for females[1]), compared to just 25 two centuries ago. Over the last 50 years, the average life expectancy has increased globally by over 20 years, from 46.5 in 1950–1955 to 69 in 2010, corresponding to an average life expectancy increase of 4 months per year over the considered period. Increased life expectancy is linked to economic development, increased food quality and quantity, and major sanitation and public health policies, resulting notably in lower infant mortality rates.

The average life expectancy increase over the last 50 years has been greater in developing countries than in developed countries. Compared to 11 years in developed countries (Europe, North America, Australia, Japan, and New Zealand), the average life expectancy increase was 17 years in developing countries with high mortality rates and 26 years in developing countries with low mortality rates[2] (see Fig. 4.1).

The most significant increases have been recorded in transition countries, where economic development and improved sanitation have been most recent. For example, the average life expectancy in China increased from 68 in 1990 to 74 in 2010, from 58 to 64 in India and from 65 to 72 in Morocco. There has also been significant progress in Latin America and the Caribbean (see Fig. 4.2). In Africa, progress has been much slower and more recent than in Asia. Despite being at the same level over 50 years ago, Africa and Asia have significantly diverged since then.

[1] *World Data Sheet* (2011), published by the Population Reference Bureau.

[2] The WHO distinguishes between developing countries with high mortality rates, with high child and adult mortality rates (sub-Saharan African countries and poor countries in Asia, Latin America and the Eastern Mediterranean) and other developing countries (the most developed countries of South and Central America and Asia) with low mortality rates (WHO 2003).

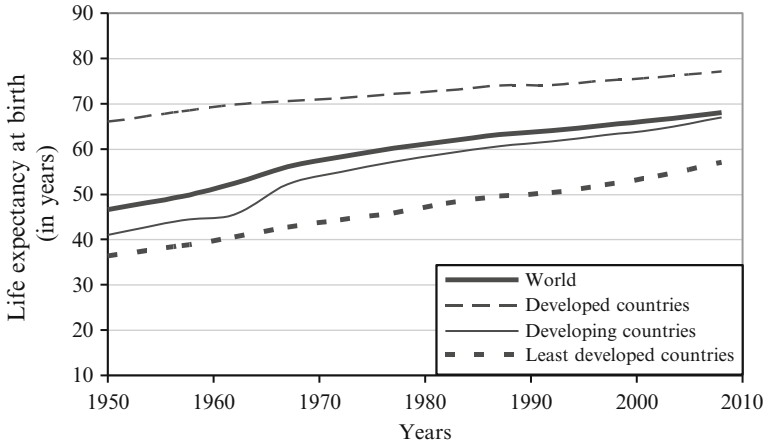

Fig. 4.1 Evolution of life expectancy at birth in developed and developing countries (1950–2010) (Source: World Population Prospects, the 2010 Revision, United Nations 2011a)

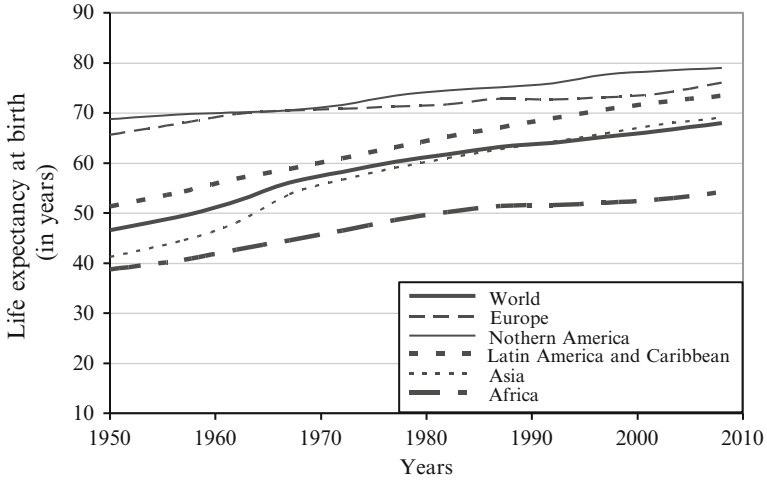

Fig. 4.2 Change in life expectancy at birth by major region of the world (1950–2010) (Source: World Population Prospects, the 2010 Revision, United Nations 2011a)

Mortality disparities increased constantly since the beginning of the health transition in Europe until sub-Saharan African countries entered the health transition. There has been some progress in most African countries, although the improvements have been more limited than in Asia, where there are wide variations, with, for example, rapid and significant progress in China and Korea and slower trends in South Asia (India, Bangladesh). In Africa, improvements, though sometimes significant, have been much more recent. The largest areas of high mortality are still found in Africa.

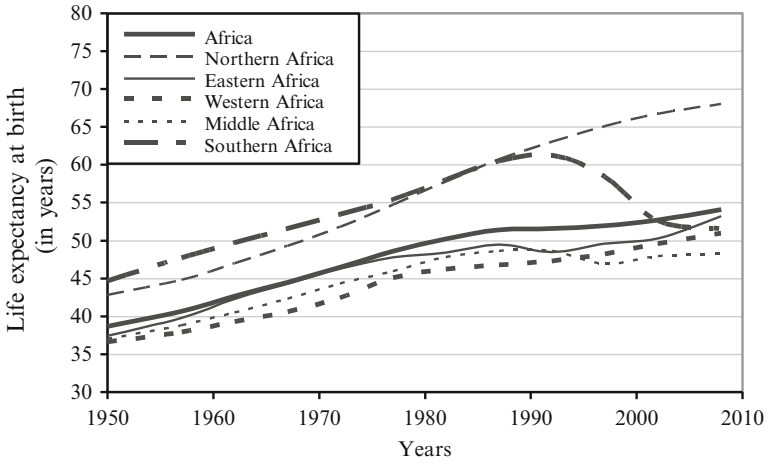

Fig. 4.3 Change in life expectancy in Africa (1950–2010) (Source: World Population Prospects, the 2010 Revision, United Nations 2011a)

The global increase in life expectancy conceals local variations, with cases of stagnation and even decline in life expectancy in some areas. For example, a number of former Soviet countries, which had previously enjoyed high life expectancy rates, have seen their average life expectancy decline over the last 40 years, falling below the average expectancy in Indonesia, Egypt, Brazil and Vietnam. The average life expectancy of Russian men was 62 in 2010, compared to 64 in 1960. In Ukraine, the average life expectancy has declined, from 70 in 1990 to 68 in 2010. The second group of countries to have seen a decline in life expectancy includes countries affected by AIDS or war. For example, Southern Africa, which had enjoyed the highest life expectancy on the continent until the 1990s, has since seen its life expectancy decline (see Fig. 4.3).

In the countries most affected by AIDS, life expectancy has declined by 20 years in just 15 years – from 63 to 51 in South Africa, from 60 to 42 in Swaziland, from 62 to 41 in Zimbabwe, and from 61 to 42 in Lesotho (between 1990 and 2006). In short, the gap between economically developing North African countries and sub-Saharan African countries, the least developed countries in the world, has increased over time.

The significant gap between developed and developing countries in the 1950s has given way to another disparity within developing countries and affecting the least developed countries in the developing world. The gap between developing countries has thus widened.

4.1.2 Life Expectancy Disparities

There are still significant variations and inequalities, not only between developed countries and the rest of the world, but also within the developing world itself. According to data provided by the *World Population Data Sheet* published by the

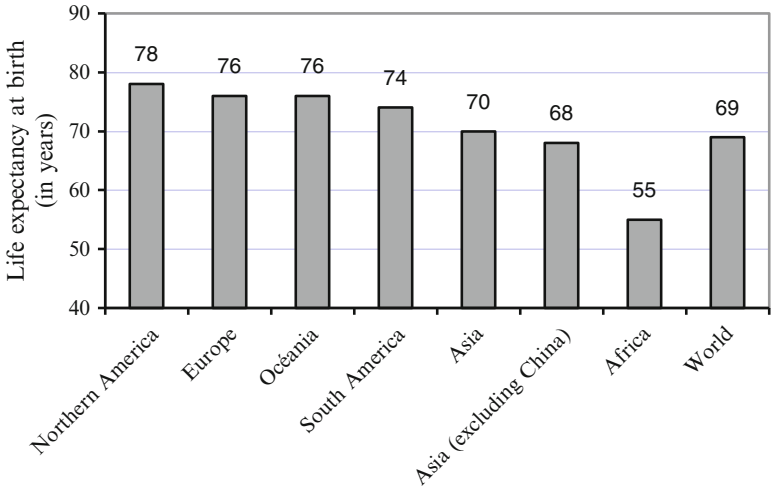

Fig. 4.4 Life expectancy at birth by continent (Source: Population Reference Bureau 2011)

Population Reference Bureau (PRB) in 2011, the average life expectancy at birth in 2010 was 78 in North America, 76 in Europe and 74 in Latin America and the Caribbean. Life expectancy at birth is also high in Asia (70), but is lower if China is excluded (68). By contrast, the average life expectancy in Africa is just 55 (Fig. 4.4).

Life expectancy at birth ranges from 80 in most developed countries to just over 40 in sub-Saharan Africa (Table 4.1).

The gaps between different continents are a reflection of the broader inequalities between developed and developing regions (see Fig. 4.5). Compared to developed countries, life expectancy at birth is on average 10 years lower in developing countries and 20 years lower in the least developed countries. Many developing countries have yet to complete the health transition, which has occurred much later than in developed countries.

In addition to major regional inequalities (i.e. between developed and developing countries), there are also significant variations within different regions of the world (see Fig. 4.6). For example, in Africa, there are significant differences between North Africa (69) and sub-Saharan Africa (52). On average, life expectancy is just 48 years in Central Africa, 51 in West Africa, 53 in East Africa, and 55 in Southern Africa. In these regions, men and women live 40 years less on average than in Western Europe and Japan. The differences of life expectancy are highest in South Asia, where the average life expectancy ranges from 44 in Afghanistan to 74 in Sri Lanka. In South East Asia, the average life expectancy in Myanmar (58) is almost 20 years lower than in Malaysia (74). In North Africa, the average life expectancy ranges from 58 in Sudan to 74 in Tunisia.

The life expectancy of women is higher than the life expectancy of men in every country, including developing countries. However, the difference between the life expectancy of women and men is less significant in the developing world – just 1 or

Table 4.1 Countries with the highest and lowest average life expectancy

Countries with the highest life expectancy at birth		Countries with the lowest life expectancy at birth	
Country	Life expectancy at birth (in year)	Country	Life expectancy at birth (in year)
Hong Kong	83	Malawi	49
Japan	83	Central African Rep.	49
San Marino	83	Chad	49
Italy	82	Somalia	49
Switzerland	82	Equatorial Guinea	49
Macao	82	Dém. Rép. of the Congo	48
Singapore	81	Mozambique	48
Israel	81	Niger	48
Canada	81	Nigeria	47
France	81	Sierra Leone	47
Iceland	81	Angola	47
Norway	81	Swaziland	46
Sweden	81	Guinea-Bissau	46
Spain	81	Afghanistan	44
Australia	81	Zimbabwe	43
		Zambia	42
		Lesotho	41

Source: Population Reference Bureau (2011)

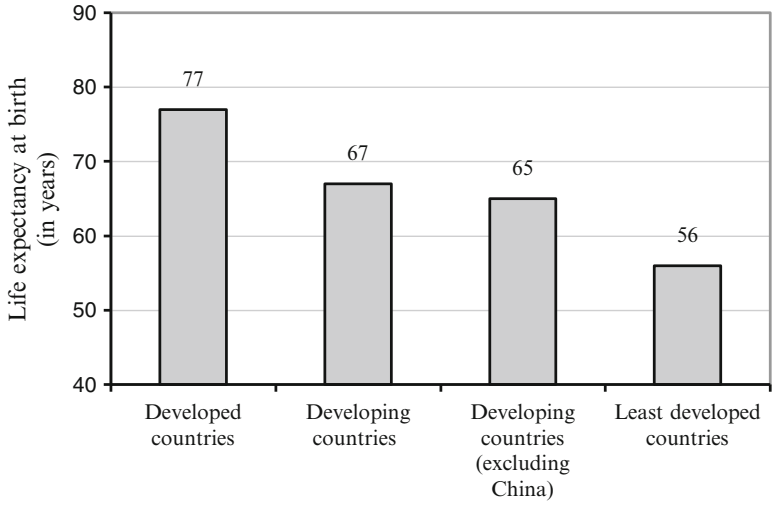

Fig. 4.5 Life expectancy at birth developed regions and developing regions (Source: Population Reference Bureau 2011)

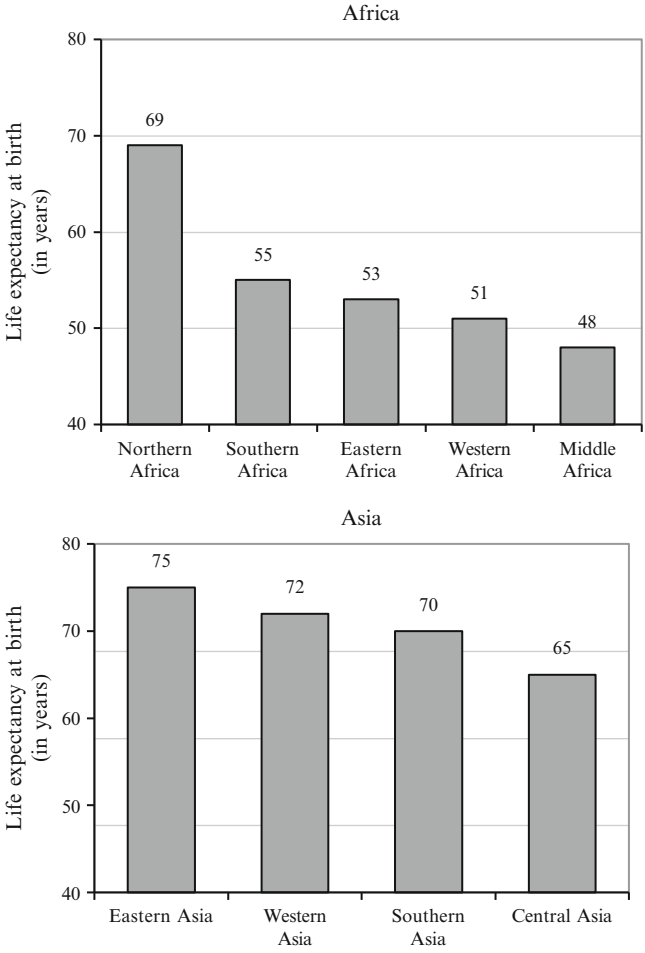

Fig. 4.6 Life expectancy at birth in Africa and in Asia (Source: Population Reference Bureau 2011)

2 years in the countries with the highest mortality rates, compared to 5–6 years on average in developed countries. In these countries, excess female mortality compensates for excess male mortality.

Life expectancy is heavily dependent on the level of infant mortality, which remains high in developing countries. Child survival is the top international priority of developing countries in the area of health. By contrast, the assessment of health problems among adults is only taken into account in developed countries, where premature infant mortality has decreased significantly. Nevertheless, maternal mortality remains another major concern in this area.

4.2 Child Mortality

As noted by the WHO in its 2005 report entitled *Make Every Mother and Child Count*, the future health of a population depends on the health of children today. 8.8 billion children under five died in 2009 (WHO 2010b). However, for the first time in history, the number of child deaths dropped below ten million (WHO 2009). There has been significant progress in this area since 1970, when the number of child deaths stood at 17 million. Infant and child mortality is the fourth Millennium Development Goal (goal 4). The aim is *To reduce mortality among children under five by two thirds between 1990 and 2015*. Mortality has declined since 1990 (12.5 million deaths), but not sufficiently to reach the target set by the MDGs, and has occurred at different rates, resulting in significant disparities. The causes of child deaths are easily preventable.

4.2.1 Different Trends

Of the 8.8 million worldwide deaths of children under five, 98 % occurred in developing countries and half (4.4 million) in Africa, while 47 % occurred in Asia. Today, there are 10,000 fewer child deaths every day compared to 1990. The decrease of mortality has accelerated worldwide since 2000, since the annual rate of decrease has risen from 1.4 % in the 1990s to 2.3 % over the period 2000–2010.

Globally, the mortality rate of children under five is 65 per 1,000 live births. The child mortality rate has decreased since 1990 (90‰). The mortality rate of children under one was 45 per 1,000 live births in 2010, compared to 152‰ in the 1950s and 62‰ in the 1990s. These global rates are a reflection of the prevailing rates in the developing world, where the child mortality rate dropped from 67 to 50‰ between 1990 and 2010, while the infant and child mortality rate declined from 100 to 71‰. While child mortality has declined in all regions of the world, its decline has been neither simultaneous nor identical from one region to another (see Figs. 4.7 and 4.8).

Specific Indicators of Infant Mortality

The death rate among children under one is measured by the infant mortality rate, which relates the number of deaths between 0 and 1 years of age (over the course of a year) to the number of live births over the same year. Like most demographic rates, the infant mortality rate is expressed per 1,000 population. It would be more accurate to describe the infant mortality rate as a ratio. Infant deaths are unequally distributed throughout the first year of life, with a significant proportion occurring in the first month and even the first week or day. Specific rates (or ratios) are used to measure mortality over these periods.

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The number of deaths in the first 4 weeks or the first month is used to estimate the neonatal mortality rate, which relates the number of deaths throughout the period to the number of live births throughout the year. Similarly, the early neonatal mortality rate is estimated based on the number of deaths in the first week, while the post-neonatal mortality rate is estimated based on the number of deaths after the first month (or the first 4 weeks).

The perinatal mortality rate is measured based on the number of stillborns and deaths in the first week divided by the number of stillborns and live births over the examined year. All infant mortality rates can be translated into probabilities (i.e. the risk of dying) since they are measured based on the number of births over the year and not the average population. The mortality rate of children under 5 years (infant-juvenile mortality) is generally expressed as the ratio between the number of deaths of children under 5 years and the number of live births over the year. Others measure it by dividing the number of deaths of children under 5 years by the number of people-years lived by children of this age (Person-years are the number of years of the time spent by all members of a population category).

Developing countries, particularly those with high infant mortality rates, have no data on the causes of child deaths. Estimates are based on intense demographic surveillance systems, which are generally not representative of the countries where they operate, or on hospital data relating to populations selected by urban area of residence or level of income. Most studies on infant and child mortality are based on retrospective data from secondary analyses of surveys (Demographic and Health Surveys), the principal aim of which is to measure and analyze fertility. A significant number of studies have been based on the reproductive history of women and the outcome of successive pregnancies to generate estimates of infant and child mortality and then to measure differentials. In this case, the estimation of infant mortality is limited to the number of child deaths over the 5 or 10 years before the survey, by way of overcoming the problem of the statistical rarity of deaths.

The most significant advances have been made in developing countries where the infant and child mortality rate was already low. By contrast, the decline has been less significant in countries with higher mortality rates. The most significant decreases have been recorded in North Africa, East Asia, West Asia, Latin America and the Caribbean. Economic growth, increased food security and generalized health care have been significant factors in the improvement of child survival rates. Despite major obstacles, significant progress has been made in countries such as Bangladesh, Bhutan, Mongolia and Nepal, where the mortality rate of children under five has decreased by 4.5 % or more every year since 1990, resulting in a significant reduction of infant and child mortality rates since 1990 (from 150 to 60‰). Similar trends have been observed in Latin America, and in particular

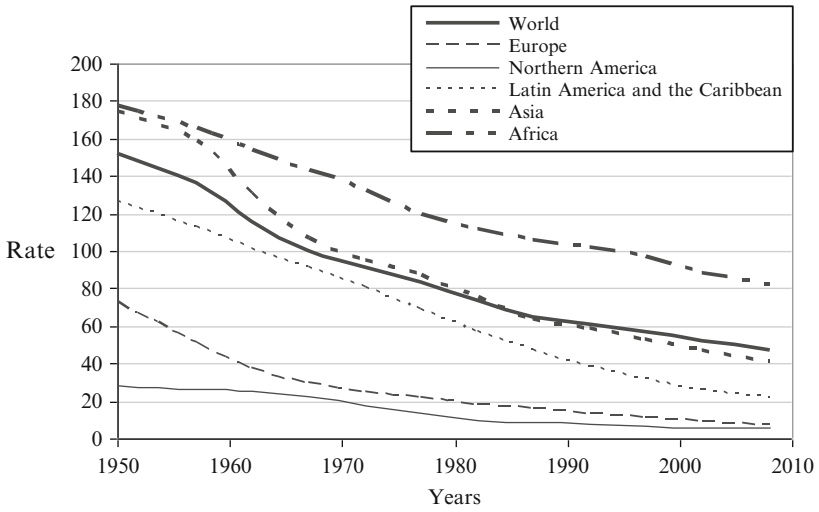

Fig. 4.7 Change in infant mortality rate (per 1,000 live births) (Source: World Population Prospects; the 2010 Revision, United Nations 2011a)

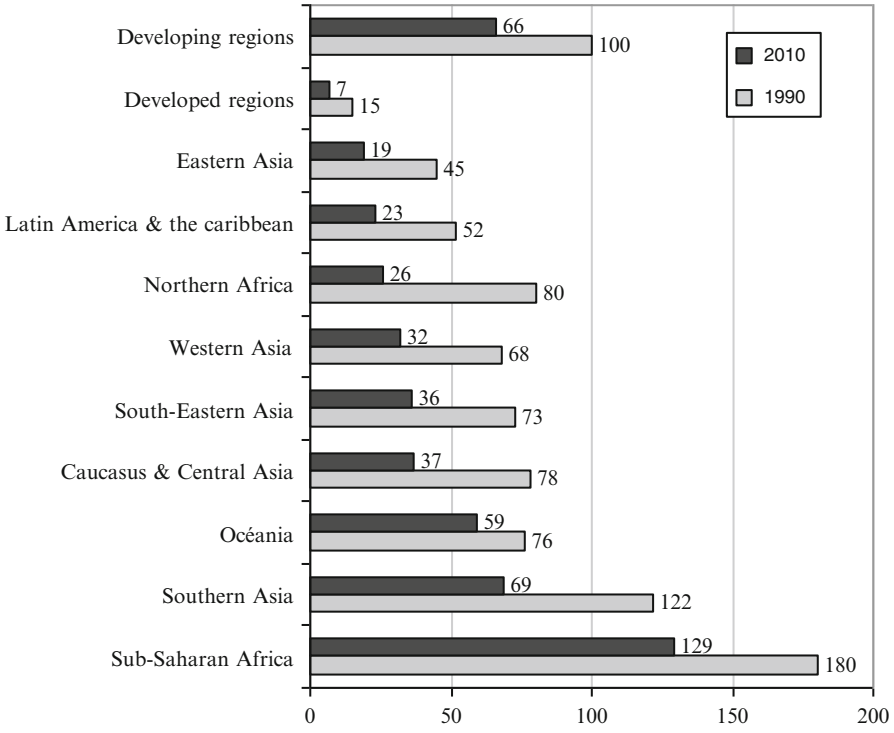

Fig. 4.8 Under-five mortality rate in 1990 and in 2010 (deaths per 1,000 live births) (Source: United Nations 2011b)

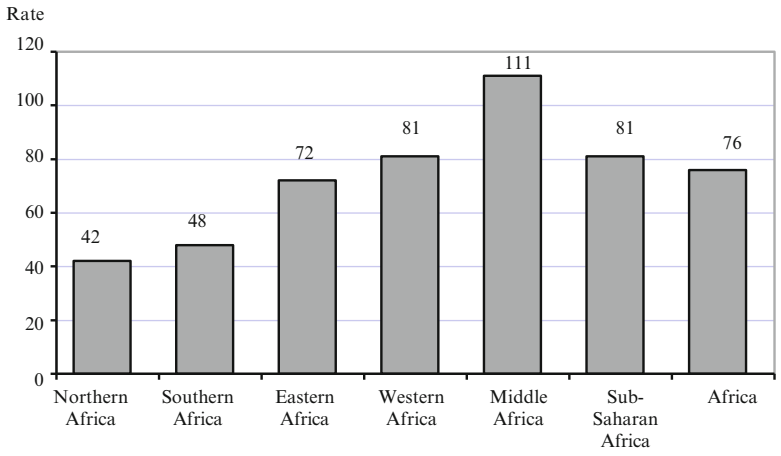

Fig. 4.9 Infant mortality rate in Africa (per 1,000 live births) (Source: Population Reference Bureau 2011)

Bolivia. The least progress has been made in sub-Saharan Africa, with the mortality rate of children under five declining by 22 % between 1990 and 2010, compared to 70 % in North Africa. Over 50 years ago, the infant mortality rate in Asia and sub-Saharan Africa was close to 200‰. However, the infant mortality trends in these regions have since diverged. While infant mortality rates have declined steadily in Asia, dropping to 41‰ in 2010, the level of mortality in sub-Saharan Africa has declined at a much slower rate, and was still 81‰ in 2010, i.e. double the rate in Asia. The lack of progress in terms of child survival is a reflection of the lack of basic health services in some regions of developing countries.

Despite these improvements, many countries still have extremely high infant and child mortality rates and have made little or no progress in recent years. The disparities between different developing regions, and within the same region, have also increased. Infant and child mortality rates remain high in South Asia, where 1 in every 14 children dies before the age of five (i.e. 74 deaths per 1,000 live births). The highest mortality rates are in sub-Saharan Africa. In 2010, one child in seven died before the age of five. All of the 34 countries where the mortality rate was above 100 deaths per 1,000 live births in 2010 are in sub-Saharan Africa, with the exception of Afghanistan, where 165 newborns per 1,000 live births die before the age of one, compared to under 5‰ in most developed countries. Central Africa has the highest levels (see Fig. 4.9), with 111 children per 1,000 live births dying before the age of one and 169 dying before the age of five.

Between 1999 and 2005, the mortality rate of children under five remained constant and even increased in some Central and Southern African countries heavily affected by AIDS (transmitted from mother to child), war and poverty, such as Lesotho (from 95 to 123‰), South Africa (from 57 to 66‰) and Zimbabwe (from 75 to 80‰). Mortality has remained constant in other countries, including the Democratic Republic of Congo (199‰) and the Central African Republic (175‰). A child born in Sierra Leone is three and half times more likely to die before the age

of five than a child born in India and over 100 times more likely to die than a child born in Iceland or Singapore. In sub-Saharan Africa, the number of deaths among children under five rose from 4 million in 1990 to 4.4 million in 2010 as a result of high fertility combined with even higher mortality rates. The relative contribution of sub-Saharan Africa to overall mortality rates among children under five has thus increased from a third in 1990 to a half in 2010.

Infant and child mortality is everywhere higher among boys than girls, with some exceptions, such as China, India, Nepal and Pakistan, where female mortality is higher than male mortality. In China, where the gap is particularly wide, the risk of death is 33 % higher among girls than among boys (WHO 2010b). These inequalities are related to the better food and care provided to boys and to female infanticides.

There are also continuing disparities according to socioeconomic status. The most significant improvement of child survival has been in the wealthiest households and in urban areas and among children with educated mothers. Poor populations appear to have been excluded from the health measures taken over the last decade. In short, the risk of infant and child mortality varies within the same country according to the level of poverty. According to data provided by demographic and health surveys, the children of poor families are significantly more likely to die before the age of five than the children of wealthy families. For example, in Niger, poor children are 13 % more likely die in childhood.[3] In Bangladesh, the difference is just 3 %. The infant and child mortality rate is higher among poor African populations than anywhere else, based on poverty defined by the same level of income. The probability of death among children of poor African families is almost twice as high as among poor children in the Americas. The same goes for children of wealthy families in Africa, who are twice as likely to die as their counterparts in the Americas. These children are also 16 % more likely to die than poor children in the Americas.

Despite some progress, and although the majority of infant deaths are preventable or treatable, the high infant and child mortality rates in some countries raise questions about the Millennium Development Goals, since just 10 of the 67 countries with high rates of infant mortality (i.e. above 40‰) are on course to achieve the MDG target on child survival.

4.2.2 The Causes of Child Deaths

The majority of deaths among children under five are preventable. These include infectious and parasitic diseases, the first cause of death among children in the developing world. Communicable diseases still account for seven of the ten leading causes of death. According to the WHO, in 2008, over a third of these deaths were linked to malnutrition and over 40 % to neonatal causes. The reduction of infant and child mortality is increasingly dependent on the capacity to reduce neonatal mortality. Respiratory illnesses, and especially pneumonia, still account for 18 % of

[3] 'Poor' refers to people in the lowest income quintile, while 'non-poor' refers to anyone not in the lowest income quintile.

deaths. Diarrheic diseases are the second leading cause of child deaths in the world, with 15 % of deaths, the majority of which are in developing countries. The main causes are poor sanitation and access to drinking water and food contamination. According to the WHO, malaria accounts for 16 % of deaths in the Africa region.

Neonatal mortality is a major concern and accounts for many more deaths than is commonly thought. Every year, almost four million babies die within 4 weeks of birth. Ninety-eight percent of these deaths occur in developing countries.[4] Today, neonatal deaths account for over 40 % of the total number of deaths among children under five and for over half of infant deaths. Sub-Saharan Africa and Asia have the highest rates – respectively 40 and 34 deaths per 1,000 live births in 2008, compared to 26‰ globally on average and less than 10‰ in Europe and North America. Two thirds of neonatal deaths throughout the world occur in the WHO regions[5] of Africa (28 %) and South East Asia (36 %). The gap between developed and developing countries is increasing: neonatal mortality is nine times higher in the poorest countries than in the richest countries. In Africa, women have one in five chance of losing a newborn baby at some point in their life, compared to 1 in 125 chance in developed countries. These figures do not take into account stillbirths, estimated at over three million every year.

Though significant, neonatal mortality and stillbirths only represent one aspect of child health. The illnesses and diseases responsible for these deaths also cause serious and often permanent disabilities. Over one million children who survive birth asphyxia every year go on to suffer from problems such as cerebral palsy, learning difficulties or other disabilities. For every newborn that dies, at least 20 others suffer from various neonatal infections or injuries, complications due to prematurity and other neonatal pathologies. Families are generally not ready to face such tragedies and often suffer deeply as a result (WHO 2005).

In many countries of the Eastern Mediterranean region and in Latin America and Asia, the structure of the causes of death tends to be similar to the structure observed in developed countries (Table 4.2). The pathologies of the perinatal period, particularly birth asphyxia, birth injuries and low birth weight, have become the leading causes of deaths, overtaking infectious diseases, and now account for 40 and 50 % of all deaths. This trend has not been observed in sub-Saharan Africa, where perinatal pathologies rank just fourth among the leading causes of child deaths. In this region, malaria, pneumopathies and diarrhoeal diseases account for more than half of all deaths. Roughly 90 % of child deaths caused by AIDS and malaria in the developing world occur in sub-Saharan Africa. Undernourishment and malnutrition also increase the risk of death.

The majority of these deaths could be avoided by cheap prevention and treatment, such as antibiotics for respiratory infections, oral rehydration for diarrhoea, vaccinations and insecticide-treated mosquito nets against malaria. Decent nutrition would also help to prevent many deaths. For many years, it was widely assumed that the high child mortality rates in developing countries were due to malnutrition, with

[4] More accurate estimates of neonatal mortality have emerged since 1995, based on national demographic surveys and statistical models.

[5] See in Annex 2 the WHO Regional and income grouping.

Table 4.2 Distribution of causes of death among children aged <5 years (%) by WHO regions, en 2008

	Neonatal causes[a]	Diarrhoea	Pneumonia	Malaria	Injuries	HIV/ AIDS	Measles	Other diseases
African Region	24	18	17	16	2	4	1	17
South-East Asia Region	35	13	19	1	4	0	4	23
Eastern Méditerranean Region	38	18	19	3	3	0	1	18
Western Pacific Region	49	5	14	0	6	0	0	25
Région of the Americas	51	7	12	0	6	1	0	23
European Region	42	4	18	0	9	0	0	26
GLOBAL	31	15	18	8	3	2	1	20

[a]Neonatal causes: Prematurity, birth asphyxia, neonatal sepsis, congenital abnormalities (Source: WHO 2010b)

children dying of measles or whooping cough as a result of undernourishment, and not as a result of the infection itself. Today, we know that undernourishment is more likely to be the result of infections (particularly intestinal infections) that cause diarrhoea, resulting in weight loss and delayed growth, than poor nutrition (Pison 2009). However, some progress has been made in the fight against diarrhoeal diseases and measles.

Extended Vaccination Coverage

Some deaths among children under five are due to infectious diseases that can be easily prevented by vaccination. These include measles, whooping cough and neonatal tetanus, which account for one in ten deaths and for which a vaccination is available. Vaccination is one of the simplest and most effective ways of preventing diseases and reducing mortality.

Since 1999, a major vaccination campaign has been carried out by several international organizations to support existing (and often deficient) national health services. Roughly 360 million children under 15 were vaccinated between 1999 and 2005 in 45 countries, mainly in Africa (Vaillant and Salem 2008). In 2008, 81 % of children under two were vaccinated in developing countries, compared to 70 % in 2000. This percentage has increased significantly since 1980, when it was just 17 %, although there remains much to be done to achieve the 100 % objective. The number of deaths caused by measles has declined globally by 78 % since 2000, from 773,000 to 164,000. The most significant progress has been made in sub-Saharan Africa, where vaccination coverage increased from 55 % in 2000 to 72 % in 2008, and in South Asia (from 58 to 75 %). In the countries with the lowest vaccination

coverage rates, such as Chad, Equatorial Guinea and Gabon, only half of all children have been vaccinated. Sixty percent of children have been vaccinated in Benin, Côte d'Ivoire, Liberia, Nigeria, the Central African Republic and Sierra Leone. Vaccination coverage is above 95 % in developing countries, where the provision of basic health services has increased significantly in recent years, including in North Africa, the Middle East and Latin America.

However, these averages conceal significant inequalities in access to vaccinations. Based on the data provided by 178 demographic and health surveys, access to measles vaccinations varies in different economic and social groups, with a lower coverage rate among children from poor households living in rural areas and children of parents with a low level of education. High birth order is also a factor of lower vaccination coverage, while gender has no impact, except in South Asian countries.

Vaccination against measles is a good indicator of the quality and availability of basic health services among children under five. Intense programs aimed at controlling measles have contributed to the development of a health infrastructure providing common vaccinations and other health services. Measles vaccination campaigns now represent a way of facilitating the use of other life-saving resources, such as anti-malaria mosquito nets, deworming drugs and vitamin A (WHO 2007).

According to the authors of the 2010 report on the Millennium Development Goals, the success of the fight against measles is likely to be short-lived (United Nations 2010). Because of the recent decrease of funding for measles control, many priority countries have been affected by a lack of funds to promote vaccination campaigns. Estimates suggest that without further vaccination campaigns in these countries, mortality will quickly rise, with an estimated 1.7 million deaths caused by measles between 2010 and 2013. 'However, with sufficient funding, political commitment and high-quality implementation of the second-dose measles strategy in priority countries, the exceptional gains made so far can be maintained' (United Nations 2010: 28).

Several other diseases could be eradicated by vaccinations. Poliomyelitis is on the verge of disappearing, while measles is also on its way to being eradicated. The focus now needs to be on pneumonia and diarrhoea, two of the leading causes of child deaths. There are also plans for new vaccinations against pneumococcal pneumonia and rotavirus diarrhoea, which could give a new impulse to the fight against these infectious diseases. Decent nutrition is one of the keys to prevention since malnutrition increases the risk of death.

Malnutrition: An Aggravating Factor of Child Mortality

Malnutrition among children under five remains widespread because of poor food quality and quantity, a lack of drinking water, poor sanitation and health services, and poor practices in the areas of care and nutrition.

One in four children is still underweight in the developing world, despite the progress that has been made over the last decades (from 30 % in 1990 to 23 % in

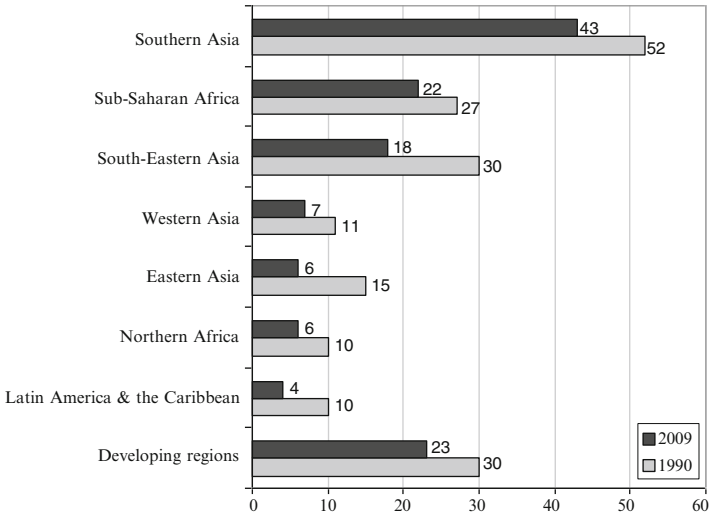

Fig. 4.10 Proportion of children under age five who are underweight, 1990 and 2009 (as %) (Source: United Nations 2011b)

2009). Progress has been made in all regions, with the exception of West Asia (Fig. 4.10). The Millennium Development Goal in this area is to reduce by half the prevalence of underweight children under five between 1990 and 2015. East Asia, Latin America and the Caribbean and North Africa have almost reached the target, with percentages under 10 % in 2009. South East Asia and sub-Saharan Africa are in the average of developing countries, with a quarter of underweight children. By contrast, South Asia is currently lagging behind. In this region, eating habits are often poor and the lack of good-quality food is common. Almost two thirds of the population have no improved sanitation, causing repeated episodes of diarrhoea among children. Almost a quarter of all babies are underweight at birth (UNICEF 2009), and many of them are subsequently unable to compensate their deficit. The combined effect of these factors is that South Asia is the region with the highest proportion of underweight children in the world (43 %).

The inequalities according to area of residence and level of poverty are reflected in the levels of child malnutrition. In developing regions, children in rural areas are on average twice as likely to be underweight as children living in urban areas. In some regions of Asia, Latin America and the Caribbean, the relative gap increased between 1990 and 2009. In East Asia, the rural/urban ratio rose from 2.1 to 4.8, with children in rural areas five times more likely to be underweight than children in urban areas. However, this region has reached relatively low levels of underweight children: 2 % of children in urban areas and 9 % in rural areas. However, the gap has increased slightly in South East Asia, sub-Saharan Africa and North Africa, indicating that more equitable progress is possible. The children from the poorest families are also twice as likely to be underweight as the children from the richest families,

all throughout the developing world. This disparity is particularly pronounced in the regions where the proportion of underweight children is high. In South Asia, 60 % of the children from the poorest households are underweight, compared to 25 % of the children from the richest households.

In order to reduce the number of underweight children under five between now and 2015 and to achieve the MDGs, the United Nations estimates that quicker and more concerted action is required to implement effective interventions in the fight against malnutrition on a wider scale (United Nations 2010). A number of simple and relatively inexpensive measures at key stages of the life of a child are known to have significant positive effects, such as the administration of micronutrients between 6 and 24 months and maternal breast-feeding in the hour following birth and exclusively for the first 6 months of the child's life.

Children are the first victims of micronutrient deficiencies, particularly iron and vitamin A. The need for iron is high at the beginning of growth, yet children are frequently and seriously affected by iron deficiencies. The WHO estimates that in developing countries, one fifth of perinatal mortality is caused by iron deficiency. There is also reason to believe that ferriprive anaemia in infancy reduces intelligence at later stages of childhood, and, in its most severe form, is a cause of mental retardation. Children under five are also highly prone to vitamin A deficiency and its consequences. Vitamin A is an essential nutrient for ocular health and vision, growth, the immune system and survival. Several (often concomitant) factors can lead to a vitamin A deficiency: insufficient food, malabsorption and increased excretion associated with common pathologies. Vitamin A deficiency is the leading cause of acquired blindness in children in many countries of the developing world. Roughly 21 % of all children throughout the world suffer from vitamin A deficiency, with the highest prevalence rates and greatest numbers of affected children found in South East Asia (30–50 % of children) and sub-Saharan Africa (30–40 % of children).

Breast milk provides newborn babies and infants with optimal food, which changes according to the changing needs of the child. Breast milk contains all the minerals and nutrients needed in the first 6 months of life, as well as immunogenic components, cell components and other defence factors providing protection against bacteria, viruses and parasites. The components of breast milk support the development of a healthy immune system. As part of its public health recommendations, and based on the current state of knowledge, the WHO recommends that newborn babies and infants should be exclusively breastfed in the first 6 months of life and that they should continue to be fed with breast milk for the rest of the first year and in the second year. 'Exclusively breastfed' means that children should not be given any water or any other kind of liquid or food. In almost all cases, breastfeeding is the simplest, healthiest and cheapest way to feed a baby, and is also most adapted to the nutritional requirements of children.

Yet exclusive breastfeeding rates are generally low. The percentage of children under 6 months who are exclusively breastfed ranges from 9 % in Europe and sub-Saharan Africa (where infant mortality rates are high) to 55 % in the Western Pacific. By contrast, the percentage of children under 6 months who are not

breastfed at all ranges from 35 % in Europe to 2 % in the Western Pacific. Even in Africa, where breastfeeding is almost universal, exclusive breastfeeding is uncommon. Among children aged 6–11 months, the percentage of children who are not breastfed ranges from 5 % in South-East Asia to 69 % in Europe. Throughout the sub-regions of Africa and South East Asia, over 90 % of children aged 6–11 months are still breastfed by their mothers.

The lack of breastfeeding, and in particular the lack of exclusive breastfeeding in the first 6 months of life, is a major risk factor of morbidity and mortality for newborn babies, infants and children in developing countries, above all because of diarrhoeal diseases and acute respiratory infections. For example, a study conducted in Brazil (WHO 2002a) showed that children under 12 months who are fed exclusively with powdered milk or cow milk are, respectively, 14 times and 4 times more likely to die of a diarrhoeal disease or an acute respiratory infection than children who are exclusively breastfed. Among those who are fed with powdered milk or cow milk in addition to breast milk, the risk of dying of a diarrhoeal disease or an acute respiratory infection is respectively 4.2 and 1.6 times higher than among children who are exclusively breastfed. Research has also shown that breastfeeding is important for neurological development, particularly for premature babies with a low birth weight and babies born small for their gestational age.

4.2.3 The Determinants of Infant and Child Mortality

Beginning with a given level of health capital at birth (birth weight, length of gestation, congenital disabilities), the capacity of the child to maintain or restore this capital is dependent on a range of factors over which the child has little or no influence. These are what demographers and epidemiologists refer to as the determinants of health and perinatal, infant and child mortality, when associated significantly with infant mortality on a recurrent basis and in various situations. These determinants, which need to be distinguished from the medical causes of death, involve multiple levels of analysis, explanation or action (Masuy-Stroobant 2005a).

As noted by Godelieve Masuy-Stroobant, there are many determinants of child health, and these determinants operate at different analytical levels. At a national level, the political choices of governments can have an impact by increasing access to health care, improving environmental sanitation (sewers, drinking water, refuse collection and processing), and promoting women's access to employment and education to ensure that the greatest possible number of people have an acceptable standard of living. At the contextual level of the living environment, the major determinants in developing countries include the quality and availability of drinking water, access to a sewerage system, the quality of housing, and the existence of, or access to, local health care services. Access to these services is closely linked to the area of residence (rural or urban).

The composition of the household and the role given to each member of the household in the distribution of household tasks or the distribution of the available

resources (food, care, education) are also key determinants of child health and mortality. The status of the family (as measured by the income, profession or level of education of the father or mother, the legal status of the partnership, and ethnicity) in the social hierarchy has an impact on access to the resources required to remain in good health. The physical characteristics of the mother, such as birth weight, pre-pregnancy weight and weight gain during pregnancy, have an impact on the child's birth weight and, therefore, on the child's health. The health of a child is also dependent on the prevention behaviors of mothers before and during pregnancy, such as the fertility model (age at pregnancy, number and spacing of births), prenatal consultations, therapeutic abortion in the event of a high-risk pregnancy, the adoption of preventive health behaviors (living a healthy life), and delivery in a hospital. Prevention must continue after birth with a healthy diet, good hygiene, vaccinations, monitoring, attention and affection.

Child health and mortality also depend on the specific characteristics of children, including birth weight, length of gestation, anomalies, and gender (excess male mortality in the first year, followed by excess female mortality up to the ages of 14–15 in cases of high mortality). Twins are also at increased risk since delivery is often premature.

This brief overview of the determinants of child health and mortality is far from exhaustive, but reflects the complexity of determining factors and the difficulty of analysis in this area. The various factors can be analyzed at different levels and are interdependent. For example, the education of mothers can be analyzed at several levels: the impact of education and the status it confers on women will depend on the political context and is likely to determine the choice of place of residence and living environment. Education provides access to a better standard of living, to more comfortable housing, and to better quality health care. 'The status it confers on women and mothers in the household means that women are better able to negotiate the distribution of resources in favor of children. This is often accompanied by behaviors focused on anticipation, investment in the future and prevention, and gives women the cognitive abilities and rationality to find solutions to the difficulties they are likely to encounter' (Masuy-Stroobant 2005a: 78).

The determinants of infant and child mortality in the developing world have been the object of many attempts at theoretical explanation. For example, research on the case of Nigeria by John Caldwell (1979) had a major impact on the interest of demographers in a more explanatory approach to child mortality in developing countries. His research on child survival showed that the level of education (and in particular the level of education of the mother) is the most discriminating socioeconomic factor. Education increases the ability to break with tradition and promotes the adoption of new therapies and new behaviors toward children. Educated mothers are more likely to use health services and are better able to communicate with health workers. They are also better able to emancipate themselves from traditional family structures and to be more autonomous from their elders. Most studies published after Caldwell have referred to these hypotheses.

The major explanatory models of child mortality emerged in the demographic literature in the 1980s, focusing mainly on the determinants of high infant and child

mortality in developing countries. The various models draw a distinction between intermediate and proximate determinants with a direct impact on the chances of survival of children and other variables (or determinants) exerting an indirect effect through these intermediate variables. The main models cover the major developing regions (Asia, Africa and Latin America) and aim to classify the full range of risk factors and presumed causes of early death identified in the literature and to combine social and biomedical approaches.

The model developed by Srinavasa Meegama in 1980 distinguishes between neonatal deaths and post-neonatal and infant deaths.[6] Meegama's approach is an extension of the classical epidemiological model of infectious diseases, rather than an attempt to integrate the paradigms of social and medical science. Child mortality is analyzed based on broad categories of causes of death (respiratory diseases, digestive diseases and malnutrition-related diseases, anaemia, etc.) in order to identify the carriers or vectors (air, water, environment, adequate food) and the determinants of exposure or contamination. The interest of this approach is that it provides a broad view of the biological determinants of child mortality. Malnutrition was found to be a direct cause of death, but also a contributing factor interacting with infectious diseases. However, this model is limited to the individual, and was made obsolete by later models.

The model developed by Garenne and Vimard (1984) extends beyond individual socio-economic factors by including political and ecological factors. In this model, infant and child mortality is viewed globally, as is the case in most of the models developed to account for demographic trends in developing countries. Garenne and Vimard (1984) identified five groups of variables:

- Socio-economic variables (geographical characteristics, level of economic development, political regime, etc.);
- Independent variables breaking down the variables defined in the previous level (for example, geographical characteristics vary according to climate, season, place of residence, etc.);
- Intermediate variables mediating the effect on child survival or cause of death;
- Determining variables or the medical causes of death;
- The independent variable, i.e. the global mortality rate.

The variables are classified according to their relationship with the risk of death.

'Mosley and Chen (1984) keep the idea of a distinction between independent and intermediate variables, but they classify the independent variables by level of observation or analysis into household-related individual variables and community variables. The authors state that they mean to suggest a framework integrating the social and biomedical sciences approaches. They do it in two ways. First, they combine the nutritional level of growth faltering (nutritional status) of the survivors with the level of mortality of the respective birth cohort into a more general health index for the dependent variable. In doing this, the authors go beyond the

[6]The models presented in this section are drawn from Masuy-Stroobant (2005b).

usual deceased-survivor dichotomy, classifying the survivors by their health levels, with death being considered an extreme situation of ill health. The point was to consider child mortality "more as a chronic disease process with multifactorial origins than as an acute, single-cause phenomenon" (Mosley and Chen 1984: 41). Second, they select proximate determinants (or intermediate variables) in which "clinical" relevance with regard to the risk of malnutrition or death is combined with their being observable or measurable in studies made at the population level. The intermediate variables or proximate determinants are categorized into five major groups: maternal factors linked to reproductive behavior, environmental contamination, nutrient deficiency, injury, and personal illness control […]' (Masuy-Stroobant 2005b: 237).

Alberto Palloni (1985) laid greater emphasis on action and aimed to demonstrate the importance of social policy and 'horizontal' interventions. His explanatory model was designed as an aid for the development and implementation of health policy. Palloni's model contains three levels of action: measures emphasizing social policies and horizontal interventions, the individual and collective level, and the biomedical level.

In developing countries with high mortality rates, infant and child mortality trends differ significantly from infant and child mortality trends in developed countries in terms of level, calendar, the structure of the causes of death, method of measurement, the search for determinants and the identification of policy priorities.

4.3 Adult Mortality Trends

Our knowledge of adult mortality in developing countries remains limited because of a lack of data. However, we know that adult mortality has declined in most regions of the world over the last decades. Life expectancy at 15 has increased by 2–3 years in almost every country in the last 20 years as a result of the improvement of adult health. The risk of death among people aged 15–59 years fell from 354‰ in 1955 to 210‰ in 1990 and 180‰ in 2008.

The rate and scale of the decrease varies significantly according to gender and region (Fig. 4.11). The most notable trend is the reversal of the decline in Africa in the 1990s, making way for an increase up to 2000. The renewed increase of mortality has been so pronounced that in some sub-Saharan African countries, the adult mortality rate was higher in 2000 than it was roughly 30 years ago. AIDS is the main factor. Since then, adult mortality rates have again decreased in all regions of the developing world.

The differences between countries with low mortality rates and countries with high mortality rates have increased the gap between developing countries (particularly in Africa) and developed countries. In 2008, adults in some areas of sub-Saharan Africa were four times more likely to die than adults in countries with low mortality rates in the WHO Western Pacific region. Globally, the gap between countries with

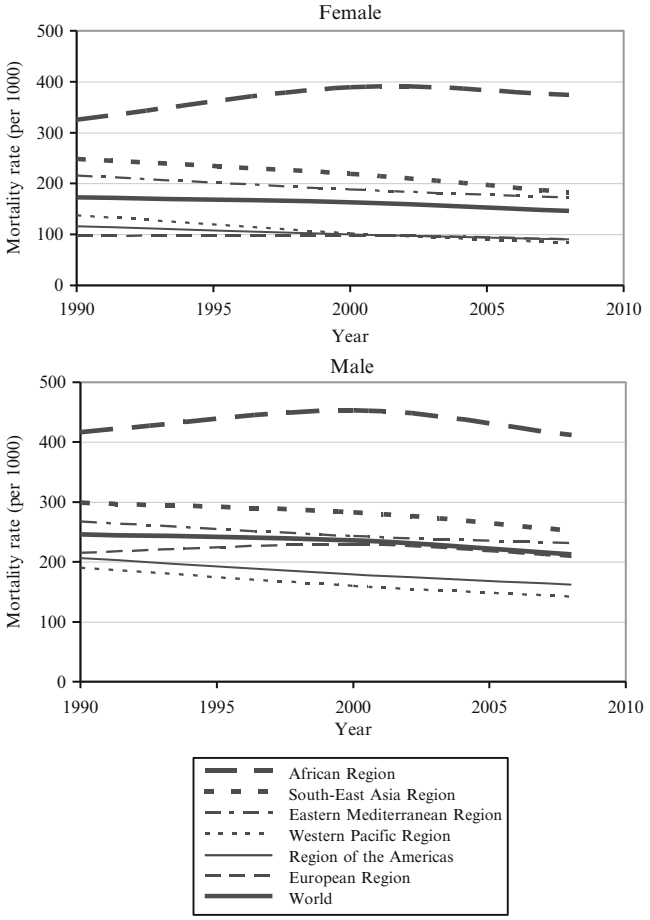

Fig. 4.11 Change in adult mortality rate by sex in WHO regions (Source: WHO 2011)

the highest adult mortality rates and countries with the lowest adult mortality rates is 1–12. In all of these regions, male mortality rates are higher than female mortality rates.

In the developing world, adult mortality is mostly due to communicable diseases, while in developed countries the leading causes of death are non-communicable diseases and injuries (Table 4.3). In Africa, 80 % of adults die of a communicable disease, compared to 50 % in South East Asia. However, a major concern is that in Latin America and the Western Pacific region, three quarters of all adults die of a non-communicable disease or injury, indicating that the health transition is relatively advanced in these regions, which are already subject to a double morbidity burden (see Chap. 6).

The most deadly communicable diseases in developing countries are AIDS and tuberculosis. In sub-Saharan Africa, HIV infection has become the leading cause of

Table 4.3 Distribution of deaths by broader causes by WHO regions in 2004 (%)

WHO Region	Communicable diseases	Non-communicable diseases	Injuries
African Région	80	13	7
South-East Asia	52	31	17
Eastern Mediterranean	55	30	15
Western Pacific	24	57	19
Région of the Americas	25	55	20
European Region	12	70	18
World	51	35	14

Source: WHO (2010b)

death among adults aged 15–59 years. The United Nations estimates that in 2008, two million people died of AIDS, including 80 % in sub-Saharan Africa, corresponding to approximately 5,000 deaths per day, i.e. half of all deaths among those aged 15–59 years. WHO statistics indicate that in 2007, the global AIDS mortality rate was 30 per 100,000 people. Compared to 13 per 100,000 in South East Asia, the AIDS mortality rate is 74 per 100,000 in the WHO African region. The impact of AIDS on mortality is most pronounced in Botswana, Lesotho, Swaziland and Zimbabwe, reducing the life expectancy of men and women by over 20 years.[7]

In 2009, tuberculosis killed 1.8 million people, half of whom were infected with AIDS. Many of these deaths were caused by lack of access to antiretroviral therapy. Tuberculosis mortality rates have decreased significantly in developing regions (Fig. 4.12), falling from 37 per 100,000 in 1990 to 23 per 100,000 in 2009[8] (United Nations 2011b). The increase in mortality in sub-Saharan Africa throughout the period as a whole is the result of an increase in mortality rates up to 2003 followed by a decrease, though without reaching the lowest levels of the 1990s. Sub-Saharan Africa will struggle to achieve the Millennium Development Goal to reduce tuberculosis mortality by half between 1990 and 2015 because of the impact of AIDS.

Adult mortality in developing countries is also heavily marked by high female and maternal mortality rates (an issue examined in Chap. 5).

There has been relatively little research on elderly adult mortality in developing countries. Although elderly people are still relatively numerous in these regions, 42 % of adult deaths occur among people aged over 60 (compared to 80 % in developed countries). In most developing regions, people have a 60 % chance of dying at age 60 or over (70 % in sub-Saharan Africa), compared to 40 % in the developed countries of Western Europe.

In the decades to come, population ageing will apply to all countries across the globe, including developing countries. While the impact of these changes on health and income security is already at the heart of discussions among policy and decision

[7] The health effects of HIV/AIDS will be examined in greater detail in Chap. 6 (on morbidity).

[8] In developed regions, the tuberculosis mortality rate dropped from 8 per 100,000 in 1990 to 4 per 100,000 in 2009.

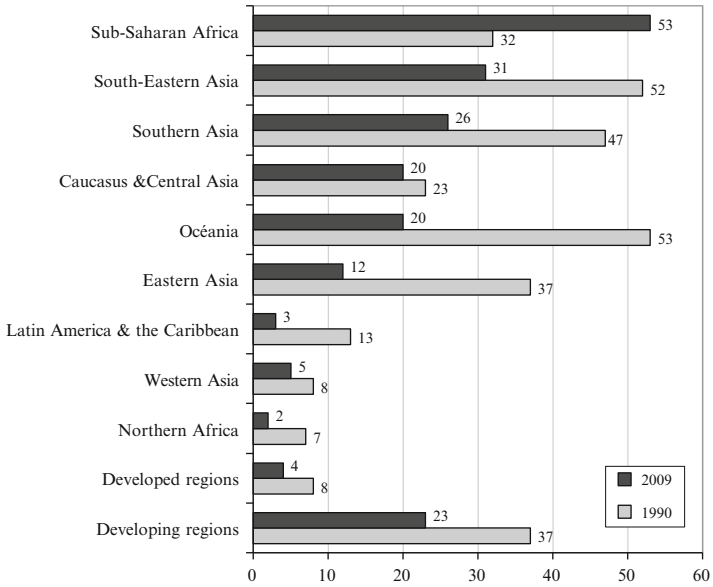

Fig. 4.12 Number of tuberculosis deaths per 100,000 population, 1990 and 2009 (excluding people who are HIV-positive) (Source: United Nations 2011b)

makers in developed countries, the economically less developed regions have yet to fully comprehend the speed and impact of this phenomenon. By 2025, the elderly population in countries such as Brazil, China and Thailand will exceed 15 % of the total population, while in Colombia, Indonesia and Kenya, the numbers could potentially quadruple within the next 25 years – up to eight times higher than the increases in the aged societies of Western Europe, where population ageing has occurred over a much longer period.

Two factors account for these trends: the decreased proportion of children, resulting from a decline in fertility rates in the general population, and the increased proportion of adults aged 60 and over as mortality rates drop. As a result of the current demographic transition, health and social policy-makers face a number of major challenges. As the population ages, the burden of non-communicable diseases increases. However, the example of developed countries shows that the prevalence of chronic diseases and disability rates among the elderly can be reduced by effective health promotion policies and effective strategies for the prevention of non-communicable diseases. One major concern is that the prevalence of risk factors for chronic diseases is currently increasing in developing countries. By failing to take the opportunities to prevent or treat age-related non-communicable diseases, health systems will cause an increase in the incidence, prevalence and complications of these diseases and will need to use resources urgently required for other priorities, such as maternal and infant health. The improvement of health systems and of their capacity to respond to population ageing is justified economically. As the

proportion of dependent elderly people increases in most countries, the economic contribution of elderly people and their production capacity will become increasingly important. Helping people to remain in good health and providing them with a good quality of life in old age will be one of the main challenges for health sectors in both developed and developing countries (WHO 2003).

4.4 Conclusion

The level of mortality, measured by indicators based on life expectancy or mortality rates, provides a good measure of the general health of a population. Child mortality levels and trends are particularly indicative of the state of public health since deaths among children under five represent 20 % of the global number of deaths.

Most of the figures quoted in this chapter are drawn from WHO statistics. As far as possible, mortality estimates are established based on death records reported every year to the WHO. For countries where data are unavailable or unreliable, household surveys and censuses are used to construct life tables based on a model developed by the WHO generating estimates of mortality rates and life expectancy. The WHO aims to standardize the methods used to estimate and project indicators for all member states based on comparable data. This approach can cause discrepancies with the official statistics produced by member states. It is also important to note that these estimates can be unreliable, in particular in countries that have deficient health statistics and health information systems and where the available empirical data are unreliable. Nevertheless, they provide good indicators of the health state of the population and the situation of developing regions compared to developed countries.

Life expectancy has increased in most developing countries, although in many of these countries it remains below 65 – i.e. the goal to be achieved by 2005. The global infant mortality rate has dropped significantly, although in some countries the decline remains too slow. The infant mortality rate is currently at a standstill in 29 countries and increasing in 14 countries. Child mortality is closely linked to poverty. Preventive measures such as large-scale vaccination campaigns appear to have been effective, particularly in reducing measles mortality. However, beyond the matter of compulsory vaccinations, information campaigns also play a key part, going hand in hand with environmental sanitation and the treatment of infected patients. The decline of infant and child mortality, particularly in the poorest populations, is dependent on the improvement of public health services, particularly water supply and sanitation, although the results will remain limited if the required services fail to reach those who need them the most (United Nations 2007). Education for girls and mothers is also a key factor for saving children's lives.

'The coexistence of very different mortality systems is generally interpreted at a macro-social level in terms of the level of economic and social development. The association […] is so systematic that infant mortality is generally considered to be one of the most sensitive indicators of a country's level of

development. At the individual level, the extent of inequality in infant mortality could also serve as an indicator of equity of the distribution of resources within a country' (Masuy-Stroobant 2005a: 73).

There remain profound inequalities in mortality, not only between developed and developing countries, but also within the developing world, where inequalities are increasing. The most serious problems are in sub-Saharan Africa, where mortality levels remain the highest in all age groups.

Chapter 5
Women's Health

Women's health is a major issue in developing countries. Far too many women are still at risk of dying prematurely, a state of affairs that reflects the very early stages of the health transition, but also continuing discrimination against women (Locoh 2007). The International Conference on Population and Development (ICPD) held in Cairo in September 1994 placed the condition of women at the top of the international development agenda. A 20-year action plan was developed to ensure universal access to reproductive health services based on the rights and choices of individuals. However, the question of women's health was limited to reproductive health and the health of newborn babies, with the aim of protecting women's health before, during and after pregnancy.

Pregnancy and childbirth (and their effects) remain the leading causes of death, disease and disability among women of childbearing age in developing countries. In the developing world, over 300 million women currently suffer from chronic or short-term conditions as a result of pregnancy and childbirth. Over half a million women die in childbirth every year, mostly in developing countries, leaving behind children who are more likely to die as a result.

Maternal mortality is a good indicator of the state of women's health. Good maternal health requires high-quality reproductive health services providing universal access to the most basic care. Before discussing these issues in greater detail, the first part of this chapter will examine the issues surrounding the measurement of women's health, and in particular maternal mortality.

5.1 The Measurement of Maternal Mortality

What is maternal mortality? What does the concept mean? While the concept of maternal mortality may seem simple, the definition of maternal death is a highly controversial issue, not least because maternal mortality is notoriously difficult to measure.

M. Gaimard, *Population and Health in Developing Countries*, Demographic Transformation and Socio-Economic Development 2, DOI 10.1007/978-94-007-6793-5_5,

Table 5.1 The different reference periods used to measure maternal mortality

Organizations	Reference period
WHO (ICD-10)	42 days
International Federation of Gynecology and Obstetrics (IFGO)	42 days (ICD-10)
Centers for Disease Control and Prevention (CDC) – United States	12 months
American College of Obstétrics and Gynecology (ACOG) – United States	Undefined if the cause is maternal
Royal College of Obstétrics and Gynecology (RCOG) – United Kingdom	42 days (ICD-10)

Source: Fortney (2005: 62)

5.1.1 Définitions

In the tenth revision of the International Classification of Diseases (ICD),[1] the WHO provides the following definitions of maternal death and pregnancy-related death:

- Maternal death: *'the death of a woman in pregnancy or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes'*
- Pregnancy-related death: *'the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the cause of death'*

These definitions are a significant improvement on the ninth revision. However, some experts still consider them to be inadequate, and the two criteria governing maternal mortality (the period of exposure to the risk and the cause of death) have been heavily criticized.

The reference period used by the WHO, covering the duration of the pregnancy and the 42 days after termination of the pregnancy, is not universally accepted. The WHO recognizes that it can be useful to consider late pregnancy-related deaths occurring more than 42 days but less than a year after termination of the pregnancy. Recent calls to extend the period of exposure have mainly come from developed countries where modern medicine has resulted in significantly lower maternal mortality rates, pushing it beyond 42 days. By contrast, in developing countries, the proportion of late deaths is very low. For example, in Bangladesh, studies have shown that just 5 % of maternal deaths in Bangladesh occurred between the 43rd and the 90th day after childbirth (Fortney 2005). The implication is that research on maternal mortality needs to pay close attention to the choice of reference period, particularly for the purposes of comparative studies. International organizations also use different reference periods (Table 5.1).

The causes of maternal deaths are also a subject of controversy. The causes of death are usually classified in three categories: direct obstetric deaths, indirect obstetric deaths and accidental and incidental deaths (accidents, homicides, suicides). The third category is not included in the measurement of maternal mortality.

[1] *International Classification of Diseases*, 10th Revision, Geneva, World Health Organization 2004.

The difficulties involved in classifying deaths in either one of the two other categories may result in a bias in the measurement of maternal mortality.

There is a growing consensus that accidental and incidental causes may not be unrelated to the pregnancy (Frautschi et al. 1994). Based on field research in Matlab (Bangladesh), Fauveau and Blanchet (1989) found that suicide accounts for 20 % of deaths among pregnant single women, compared to 5 % among married women. Several studies have shown that pregnancy-related suicide is not uncommon, as is domestic violence, particularly among pregnant unmarried women (killed by their family). Some studies, particularly in the United States, have shown that accidents can also be linked to pregnancy, since pregnancy is often the initial cause of an injury (Fildes et al. 1992; Greenblatt et al. 1997). Other studies have found conflicting results, suggesting that pregnant women are less exposed than other women to the risk of accidents (Ronsmans et al. 2001).

Pregnancy affects the immune system by increasing the susceptibility to infections. Some infectious diseases, such as malaria, tuberculosis, hepatitis and measles, are more serious during pregnancy and often more deadly than among non-pregnant women. Breast cancer prognosis is worse when discovered during pregnancy since it is generally at a more advanced stage.

For all these reasons, many maternal mortality experts recommend definitions that include all deaths occurring during pregnancy or the year following birth, irrespective of the cause of death. This definition may include deaths unrelated to pregnancy or childbirth, although the resulting overestimation would raise fewer difficulties than an underestimation related to the 42-day period. It also has the advantage of being simple (like the definition of infant mortality) and far easier to use than the current WHO definition (Fortney 2005).

5.1.2 Measuring Maternal Mortality

Plusieurs indicateurs sont utilisés pour mesurer la mortalité maternelle, qu'il importe de définir.

The most commonly used indicator is *the maternal mortality ratio*, measured by the ratio of maternal deaths to live births. Generally speaking, the maternal mortality ratio is expressed per 100,000 live births since it has very low values in developing countries. However, it can also be expressed per 1,000 or per 10,000 live births. A number of studies have raised the issue of the denominator: why use the number of live births rather than the total number of pregnancies? The answer is that very few countries are able to record all pregnancies or to have any knowledge of them. The chosen observation period must be the same for the numerator and the denominator. A year or longer periods are desirable since a greater number of deaths provide more reliable results. The maternal mortality ratio is sometimes incorrectly referred to as the 'maternal mortality rate', as was the case up until the mid 1980s. However, the maternal mortality ratio is not a rate since the numerator is not a subset of the denominator. This erroneous use of the term 'rate' can cause some confusion.

The indicator known as the *maternal mortality rate* is defined as the ratio of maternal deaths to the number of women aged 15–49, expressed per 100,000 women. The maternal mortality rate is an actual rate, in the same way as the gross mortality rate. However, the maternal mortality rate is seldom used, despite being easy to apply. The maternal mortality ratio estimates the risk of death from the moment of pregnancy, while the maternal mortality rate measures the risk of becoming pregnant and dying as a result. The maternal mortality rate is dependent on the level of fertility of the studied region, while the maternal mortality ratio is solely determined by the quality and availability of health services.

The *cumulative maternal mortality ratio* (or *cumulative risk of maternal death*) measures the probability that a woman reaching childbearing age will die from maternity-related causes at any age. The probability increases with the number of pregnancies. It equates to the complement to unity of the probability of surviving all pregnancies. Since data on the probability of death by parity are seldom available, the cumulative maternal mortality ratio (or cumulative risk of maternal death) can be estimated based on the maternal mortality ratio. In the example given by Judith Fortney, a maternal mortality ratio of 570 deaths per 100,000 live births (i.e. 0.0057 deaths per one live birth) corresponds to approximately 1 death for every 29 women with six children ($0.0342 = 0.0057 \times 6$), close to 1 in 35.

Another indicator is the proportion of maternal deaths – measured as the ratio of maternal deaths to the total number of deaths among women of childbearing age. In developing countries, maternal deaths often account for between 20 and 25 % of all deaths among women of childbearing age and are the leading cause of death among women of childbearing age. In industrial countries, the proportion of maternal deaths is generally below 1 %.

5.1.3 Maternal Mortality Data

Like adult mortality data, records of maternal deaths in the development world are generally poor in quality. Even with a high level of mortality, a maternal death remains an extremely rare event. As a result, maternal deaths are difficult to quantify. 'With a maternal mortality ratio of 500 per 100,000 live births and a gross birth rate of 30 per 1,000 in an area of 5,000 inhabitants, there would be 150 births and therefore barely one maternal death (0.75 on average), i.e. 3 maternal deaths in 4 years' (Fortney 2005). This example shows that in order to provide an accurate measurement of maternal mortality, the sample needs to be relatively large or the period of observation spread over several years to include a sufficient number of deaths.

There are several common sources of information on maternal deaths and a range of methods for estimating maternal deaths.[2]

[2] Developed by Judith Fortney (2005).

In principle, vital records indicate the number of maternal deaths (and indeed all deaths). However, very few developing countries have developed a comprehensive death records system. Maternal deaths are often under-reported, with the person certifying the death often omitting to refer to the pregnancy. The risk of omission increases in line with the time since childbirth. In some cases, the cause of death is not explicitly recorded to identify the maternal cause of death. While in developed countries unexplained deaths are subject to an autopsy, the same does not apply in developing countries, where autopsies are only performed on proven cases of violent death.

Hospital data are another source of information on maternal deaths. However, they are often difficult to use and interpret, with some births and other pregnancy outcomes occurring outside hospitals (i.e. at home). As such, hospitals births are not a reliable indication of the total number of births, and hospital mortality indicators only take into account hospital deaths.

Data on maternal deaths are generally collected through household surveys. The families of deceased women are interviewed to determine the cause and circumstances of the death. This method is known as the verbal autopsy method (described in Chap. 3), which can be used to determine the maternal cause of death by collecting information on the circumstances of death. Although the causes of adult mortality are easy to diagnose, some deaths remain unexplained. When the survey covers all deaths among women of childbearing age, studies in this area are sometimes known as Reproductive Age Mortality Surveys (RAMOS).

In her assessment of household surveys, Fortney (2005) identified a number of limitations related to underreporting of deaths or inaccurate information in declarations of death:

- When a death is linked to an event or situation that is deemed to be shameful (illegal abortions or pregnancies outside of marriage);
- When the cause of death is unidentified (extrauterine pregnancy);
- When the deceased has fallen into anonymity (mother with a low social status, no surviving children or no close relatives);
- When the death has occurred in a remote area;
- When the death involves an illegal act (abortion, homicide, suicide).

Other factors include the need to have a sufficiently large sample (high cost) and competent and understanding interviewers.

Another method has been developed to remedy the costs and imperfections of other data collection methods: the sisterhood method (Graham et al. 1989). The sisterhood method is based on four questions that can be easily incorporated into a retrospective survey and relating to: the number of sisters that the surveyed individual has or had, the number of sisters who (have) reached puberty, the number of surviving sisters, and the number of sisters who died of maternity-related causes. The sisterhood method provides estimates of the level of mortality over an extended period (10–12 years) before the survey, and therefore provides no indication about short-term changes. Several studies (Stanton et al. 1997; Garenne and Friedberg 1997; Garenne et al. 1997; Shahidullah 1995) have concluded that the sisterhood

method tends to underestimate maternal mortality by roughly a third. Despite these limitations, the sisterhood method has been widely used and the four questions have been incorporated into many surveys, including health and demographic surveys.

The difficulties of identifying the causes of death and estimating maternal mortality have resulted in an increasing interest in indirect estimation methods based on modelling. A model based on mortality tables was initially developed, but was later abandoned because mortality tables are seldom available for developing countries. This method is based on model life tables. All countries using the same model life table are assumed to have the same estimated level of maternal mortality, irrespective of differences in health service quality and availability. In this method, maternal mortality is estimated based on the level of infant mortality. Model life tables are thus heavily influenced by infant mortality levels. None of these methods is ideal, and all have limitations.

5.2 The Characteristics of Maternal Mortality

As a result of the increase in data availability, every country now has a maternal mortality database. Since 1990, a working group including the WHO, UNICEF, UNFPA and the World Bank regularly reviews and summarizes the available data. The most recent data suggest that some progress has been made, with some countries showing a marked decline of maternal mortality ratios. However, the rate of decrease is still far from the 5.5 % annual decrease required to achieve the Millennium Development Goal, *Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio*.

5.2.1 High Maternal Mortality

The number of women dying every year as a result of complications during pregnancy or childbirth is estimated to be 600,000. Almost all of these deaths (99 %) occur in developing countries: 51 % in sub-Saharan Africa and 45 % in Asia (34 % in South East Asia). According to the most recent UN data, the global maternal mortality ratio is 400 deaths per 100,000 births. Maternal mortality is among the health indicators showing the widest gap between rich and poor, both between different countries and within the same country.

Compared to 17 deaths per 100,000 live births in developed countries, the maternal mortality ratio in developing regions is 290 deaths per 100,000 births, in 2008 (Fig. 5.1). Sub-Saharan Africa is the region with the highest levels of maternal mortality, with on average 640 maternal deaths per 100,000 live births. In 14 countries, the maternal mortality ratio is above 1,000 deaths per 100,000 live births. Of the 20 countries where the maternal mortality ratio is highest, 19 are in sub-Saharan Africa. The targets set at the Cairo conference, calling for the least developed countries to

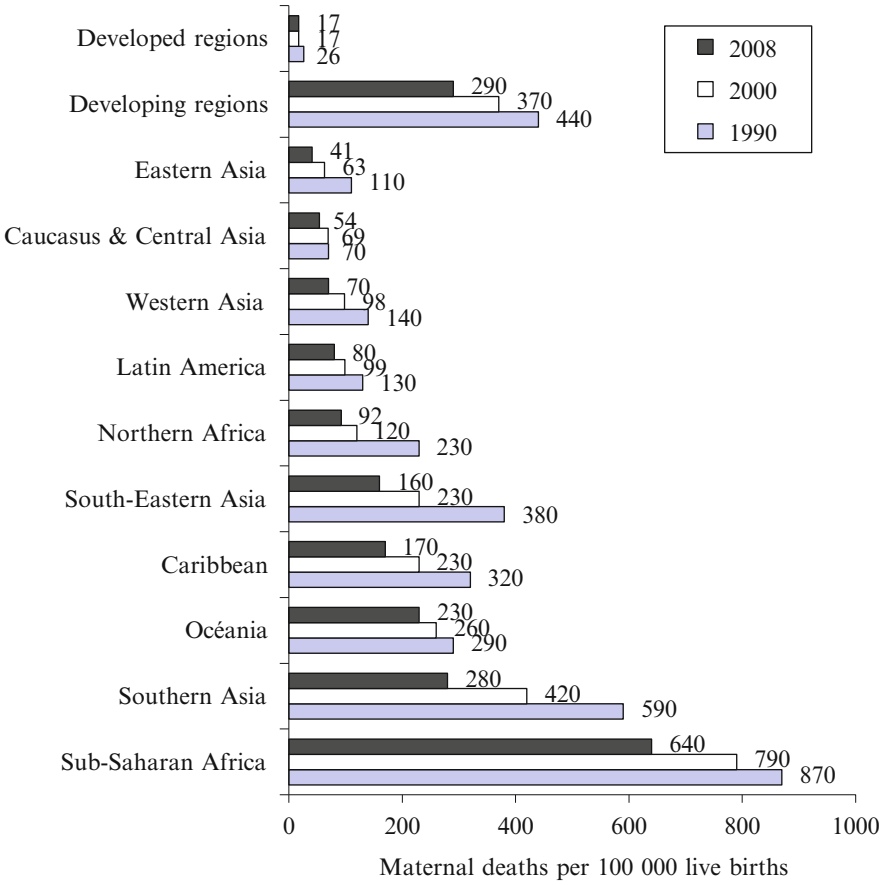

Fig. 5.1 Maternal mortality ratio per 100,000 live births, 1990, 2000, 2008 (Source: United Nations 2011b)

reduce their maternal mortality ratio to 125 deaths per 100,000 births by 2005 and to less than 75 deaths per 100,000 births by 2015, are far from having been achieved.

Currently, the available data suggest that little progress has been made throughout the developing world (440 maternal deaths per 100,000 live births in 1990 and 290 in 2008). This slight decline is not in line with the progress made in some regions of the world. North Africa, Latin America and the Caribbean, and South East Asia were able to reduce their maternal mortality rates by roughly a third between 1990 and 2005, although the progress made in these regions is still not enough to reach the targets set at the Cairo conference. In South Asia, the maternal mortality rate declined by over 20 % over the same period, although the high number of births in this region (187,000) is unsustainable. By contrast, in sub-Saharan Africa, there has been very little progress, and it is still in this region that women are most likely to die of pregnancy-related causes.

In 2008, the maternal mortality ratio ranged on a scale of 1–600 between the countries with the lowest ratios (3 deaths per 100,000 live births in Italy) and the countries with the highest ratios (1,800 deaths 100,000 live births in Niger). In countries with limited health care provision and where women have many children, such as in Africa, the risk of death increases with every pregnancy. Today, one in every ten women dies of maternal causes. In sub-Saharan Africa, women have a 1 in 16 chance of dying of (preventable and treatable) pregnancy-related complications, compared to a 1 in 7,300 chance in developed countries.

Maternal mortality data tend to underestimate the health problems affecting women as a result of pregnancy. For every woman who dies as a result of complications during their reproductive years, 30 other women are affected after pregnancy by an illness, injury or disability, sometimes related to a genital mutilation. In total, 300 million women (over a quarter of all women in developing countries) suffer from pregnancy-related conditions caused by a lack of care.

5.2.2 The Causes of Maternal Deaths

Maternal deaths are the result of pregnancy-related complications that occur during gestation, delivery or the postnatal period or as a result of various direct or indirect causes. The leading causes of maternal mortality in developing countries are obstetric complications, in particular hypertension and postpartum hemorrhage, which account for half of all deaths among pregnant women and new mothers (Fig. 5.2). Other major causes include septicemia and the effects of non-medical abortions performed in unsafe conditions (accounting for 17 % of all deaths). Indirect causes such as anemia, malaria, and HIV/AIDS account for 18 % of maternal deaths, increasing the risk of death as a result of a hemorrhage. Other direct causes such as work, complications during anesthesia or C-sections and extrauterine pregnancies are responsible for 11 % of all pregnancy and childbirth-related deaths.

The causes of death vary by country and region (Fig. 5.3). In Africa and Asia, hemorrhage is the leading cause of maternal mortality, while in Latin America and the Caribbean, high blood pressure during pregnancy and delivery is the most significant threat. Dystocias[3] and abortions account for 13 and 12 % of maternal deaths in Latin America and the Caribbean. Anemia is a significant determinant of maternal mortality in Asia. By contrast, anemia is less common in Africa and very rare in Latin America and the Caribbean. In Africa, and particularly in certain parts of Southern Africa, HIV/AIDS is often related to deaths during pregnancy or childbirth.

Risks During Pregnancy

Though less serious than childbirth risks, pregnancy-related risks are not insignificant. The WHO estimates that pregnancy-related deaths may account for up to a quarter of

[3] Difficult labor, either because of the position of the fetus or because of an abnormality in the mother.

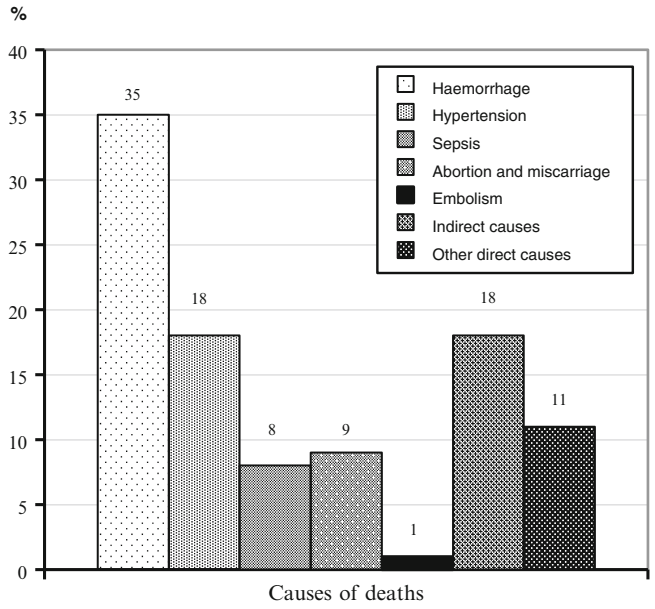

Fig. 5.2 Causes of maternal deaths in developing countries, 1997–2007 (%) (Source: United Nations 2010)

all maternal deaths, despite the incomplete data on mortality among pregnancy women (WHO 2005). The proportion of pregnancy-related maternal deaths varies widely in different countries depending on the prevalence of unsafe abortions, violence and pathologies in the region in question. For example, in Egypt, 9 % of all maternal deaths occur in the first 6 months of pregnancy, while 16 % of deaths occur in the last 3 months of pregnancy.

Besides the complications of unsafe abortions, three major health problems can occur during pregnancy: complications related to the pregnancy, an illness or disease that may or may not be made worse by the pregnancy, and the impact of an unhealthy lifestyle on the outcome of the pregnancy.

Pregnancy can lead to many complications requiring treatment. A study carried out in six Western African countries showed that a third of all pregnant women had developed an illness during pregnancy (excluding problems linked to unsafe abortions) and that hospitalization was necessary in 2.6 % of cases (WHO 2005). In Lusaka, Zambia, the study found that almost 40 % of pregnant women had been transferred to the university hospital for complications related to the pregnancy – 37 % for a risk of spontaneous abortion or abortion-related complications, 13 % for a condition unrelated to the pregnancy (such as malaria or an infection), and 9 % for hypertensive pregnancy disorders. Common pregnancy-related complications include preeclampsia and eclampsia,[4]

[4]Convulsions followed by a coma, which can occur in pregnant women.

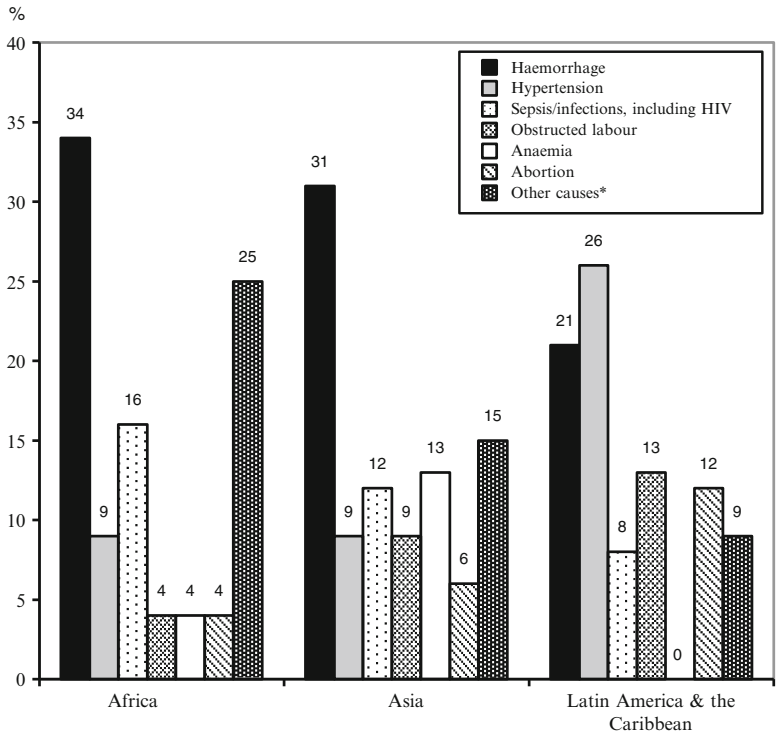

Fig. 5.3 Causes of maternal deaths in developing countries by regions 1997–2007 (%) (Source: United Nations 2007)

affecting almost 3 % of pregnant women in developing countries (compared to 0.4 % in developed countries) and causing over 60,000 maternal deaths every year. Bleeding caused by a ruptured placenta affects roughly 4 % of pregnant women. Though less common, an extrauterine pregnancy is very serious.

An illness or other problem can often complicate pregnancies and worsen during pregnancy. For example, malaria is worse in pregnant women and, combined with anemia, accounts for 10,000 maternal deaths every year. In many societies, women and girls eat last, and often only have the scraps left by men and boys, or do not eat at all. Pregnant women may also be subject to traditional food customs that can weaken them. For example, anemia is widespread among women, affecting one in three women during their reproductive life and half of all women during pregnancy. The highest rates are found in South Asia, where 75 % of all women suffer from anemia during pregnancy. AIDS is also a leading cause of death during pregnancy and is particularly widespread in areas with high prevalence rates. Tuberculosis, often diagnosed during pregnancy, accounts for 9 % of deaths among women of

childbearing age. Maternal malnutrition (protein-energy malnutrition or micronutrient deficiencies) is a major issue in developing regions. Paradoxically, obesity is becoming an increasingly prominent issue in developing countries and can lead to diabetes and complications during childbirth.

The WHO has found that mental health problems during pregnancy are more common than previously thought. High rates of psychiatric problems have been reported. Pre-existing psychological disorders can surface during pregnancy, including depression, substance abuse and suicide attempts, particularly in the event of an undesired pregnancy. Depression rates are as high at the end of pregnancy as they are postpartum (if not higher). Pregnant women are also at risk of lifestyle-related diseases. Alcohol, tobacco and drug use can be dangerous for both the mother and the fetus. The effects can be serious, including premature placental detachment, sudden infant death syndrome, fetal alcoholism syndrome and problems during child development. Pregnant women may not always see violence against women as something that health workers can resolve, thus remaining a significant but underestimated public health issue. According to studies carried out in Egypt, Ethiopia, India, Mexico and Nicaragua, between 14 and 32 % of women claim to have been the victims of acts of physical or sexual violence during pregnancy, generally from their partner. In Peru, 15 % of women in Lima and 28 % of women in the Cusco region reported that they had suffered physical violence during pregnancy (WHO 2005).

There are still far too many unplanned and unwanted pregnancies because of insufficient contraceptive supply, contraceptive failure or unwanted sexual relations. The WHO estimates that almost 100,000 maternal deaths could be avoided every year if women who do not want children used effective contraception. Unwanted pregnancies entail more risks than wanted pregnancies. In developing countries, over 18 million undesired pregnancies are terminated by abortions performed by people without the necessary skills and in substandard conditions, exposing women to serious risks. With 34 unsafe abortions per 1,000 women, South America has the highest rate, followed closely by East Africa (31 per 1,000 women), West Africa (25 per 1,000 women), Central Africa (22 per 1,000 women) and South Asia (22 per 1,000 women). Unsafe abortions are a major issue, particularly among young women. Two thirds of unsafe abortions are carried out on women aged 15–30. Approximately 2.5 million unsafe abortions (almost 14 % of the total number of unsafe abortions) in developing countries are carried out on women under 20.

In all age groups, unsafe abortions have a dramatic impact. Roughly 350 per 100,000 women are at risk of dying as a result of an unsafe abortion, and 68,000 women die every year as a result of an unsafe abortion. Non-lethal consequences and after-effects contribute significantly to the global morbidity burden, in addition to the psychological traumas associated with such practices. Unsafe abortions are also costly for health systems. Health system deficiencies and poor access remain significant obstacles to the provision of comprehensive health care following complications related to induced abortions and to the provision of abortion services, insofar as the law permits. Women, and particularly teenagers, poor women and those living in rural areas, do not always know where to find safe and legal abortion services. They may not have the resources, time or decision-making power required

to use them, or they may be dissuaded from doing so because of a lack of privacy and confidentiality or because of the behaviors of health agents. The result is that many women, particularly in developing countries, turn to unqualified providers or 'charlatans'. If women wish to terminate their pregnancy (whatever the risk) in circumstances in which abortion is dangerous, illegal or both, the implication is that it is vital for them to control their fertility.

Delivery Risks

Women are particularly at risk of maternal death during delivery and in the postpartum period. According to the WHO, between 11 and 17 % of maternal deaths occur during delivery, while 50–71 % of maternal deaths occur in the postpartum period. In the postpartum period, the most high risk period is the first week: roughly 45 % of postpartum maternal deaths occur in the first 24 h, and over two thirds in the first week.

The most common and brutal cause is massive hemorrhage (35 % of maternal deaths in the developing world). The result of a lack of care, and occurring in the immediate postnatal period, a massive hemorrhage can cause death within 2 h, even if the woman is in good health. Speed of treatment is the key factor determining the proportion of deaths.

The second leading cause of death is septicemia, the most common cause of death at the end of the postpartum period. While septicemia has been almost eradicated in developed countries, in the developing world 1 in 20 women who give birth contracts an infection that can lead to death or severe after-effects if left untreated. Every year, septicemia leads to infertility and fallopian tube obstruction in 450,000 women. Pregnancy-related hypertensive disorders (preeclampsia and eclampsia), causing 18 % of all deaths, occur during pregnancy, but also during delivery.

Obstructed labor, caused by cephalopelvic disproportion, abnormal fetal lie or presentation, accounts for 8 % of maternal deaths. In the event of prolonged labor (lasting several days), the woman may be left to die alone in pain as an obstructed labor can be interpreted as a sign of infidelity. A competent practitioner can prevent many of these issues before the dystocia appears or after concluding that labor is too slow. The most painful consequence of a poorly treated labor dystocia is an obstetric fistula. The trauma to the vaginal wall causes a hole between the vagina and the bladder, the vagina and the rectum or both. Without surgical repair, the physical effects can be serious and mainly involve vaginal incontinence (discharge of urine and fecal matter through the vagina), frequent pelvic or urinary infections, pain, sterility and premature death. The social effects are often serious, causing women to be ostracized or abandoned by their husbands, their family and their community and leading to a life of poverty. This terrible pathology affects over two million women, with a further 50,000–100,000 other mothers being affected every year, according to WHO estimates. The most affected groups tend to be young women, the main determinants being premature marriage, early and repeated pregnancies, poverty and lack of access to quality health care during pregnancy or delivery. Obstetric

fistulas are most prevalent in sub-Saharan Africa and South Asia. A greater use of cesarean delivery could help to reduce this issue.

Post-delivery complications affect 20 million women, out of a total of 140 million women giving birth. These include issues ranging from physical weakness to psychosis, and recovering from organ failure, a ruptured uterus, a fistula or other serious complications can be slow and painful and may often have long-term after-effects. Other pathologies, though not life-threatening, are also not uncommon. For example, in India, 23 % of women complain of health issues in the months following delivery. Some of these issues are temporary, while others can develop into chronic conditions such as urinary incontinence, pains caused by a poor episiotomy repair or a poor perineal tear repair, nutritional deficiencies, depression and postpartum psychosis. Though well-known, these conditions remain difficult to assess in quantitative terms (WHO 2005).

Early Pregnancies

Early pregnancies (i.e. pregnancies among women aged 15–19) are an aggravating factor of maternal mortality. The risk of dying or of suffering complications during pregnancy or delivery is higher among teenagers than among adult women. Children of teenage mothers are also at a greater risk of morbidity and mortality. Girls who give birth before the age of 15 are five times more likely to die in childbirth than women in their twenties (United Nations 2009b). Babies of mothers aged under 18 are 60 % more likely to die in their first year of life than the babies of mothers aged over 18.

High teenage pregnancy rates are an indication of a high number of early pregnancies, which often occur in circumstances that harm the health of the mother. The teenage birth rate (number of births per 1,000 women aged 15–19) in developing regions was 54‰ in 2008, compared to 24‰ in developed countries. In all regions, teenage fertility rates dropped between 1990 and 2000 (Fig. 5.4). Since then, the rate of progress has slowed, and in some regions, there has even been a renewed increase of teenage pregnancies (among women aged 15–19).

The highest rates (122‰ in 2008) are found in sub-Saharan Africa, where teenage fertility rates have changed little since 1990. Teenage pregnancies are common in sub-Saharan Africa on account of the high prevalence of early marriages among young girls. In Latin America and the Caribbean, the high teenage fertility rate is primarily related to the high number of pregnancies out of wedlock.

Early marriages (a major contributing factor of the high number of teenage pregnancies) often involve significantly older men. According to the most recent estimates based on surveys carried out over the period 1998–2007, 49 % of women in South Asia and 44 % of women in Central and Western Africa were already married by the age of 18. In Bangladesh, the Central African Republic, Chad, Guinea, Mali, Mozambique and Niger, over half of all women were married before the age of 18 and over a third were already mothers by the age of 18 (United Nations 2009b).

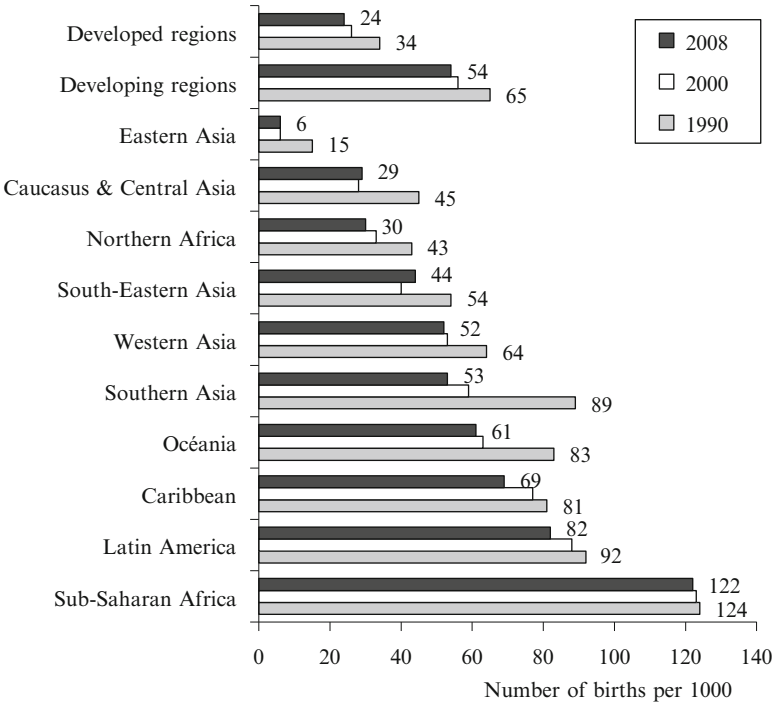

Fig. 5.4 Number of births per 1,000 women aged 15–19 by regions, 1990, 2000 and 2008 (Source: United Nations 2011b)

The 2010 UN report on the Millennium Development Goals includes the results of a study carried out in 24 sub-Saharan countries on the socio-demographic characteristics of teenage mothers (Fig. 5.5). The results show that poverty and lack of education are the major determinants of high teenage pregnancy rates. Young women living in the poorest households are three times more likely to become pregnant than women in the richest households. In rural areas, the risk is twice as high as in urban areas. The greatest disparities relate to education: girls with a secondary education are less likely to become pregnant. The pregnancy rate among women aged 15–19 is over four times higher among women with no education.

The observed disparities have tended to increase over time, with progress benefiting the most privileged groups. While teenage pregnancy rates have decreased in 18 of the 24 sub-Saharan countries, in almost all of these countries the decline has been more pronounced in urban areas, among teenagers with a secondary education and in the 20 % richest households.

Most maternal deaths could be prevented by providing better care to women during their reproductive life (before, during and after pregnancy), as shown by the leading causes of maternal death. Most maternal deaths and maternity-related conditions are a result of a lack of care during the reproductive period.

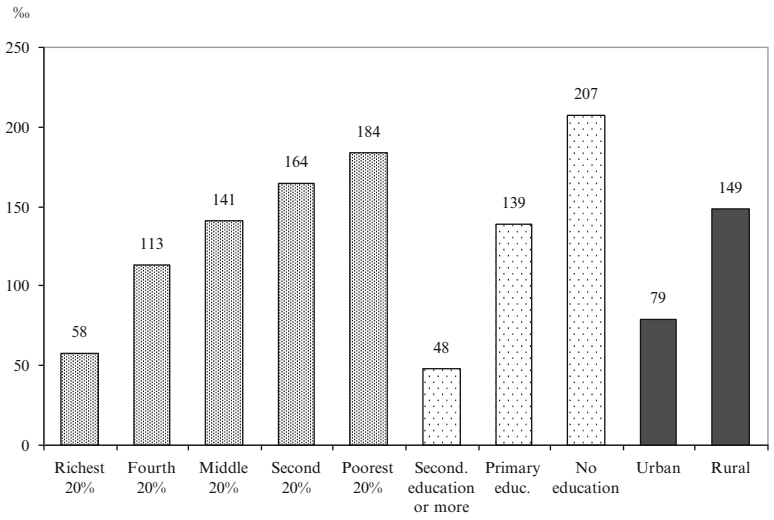

Fig. 5.5 Adolescent birth rates by background characteristics in 24 sub-Saharan African countries, 1998–2008 (Number of births to 1,000 women aged 15–19) (Source: United Nations 2010)

5.3 The Conditions of Female Reproductive Health

Good maternal health requires high-quality reproductive health services and a range of appropriately timed interventions to ensure a safe passage to motherhood (United Nations 2010). Most deaths could be avoided, in particularly by targeting hemorrhages, accounting for over a third of all maternal deaths, through interventions by qualified personnel, better environmental sanitation, training for obstetricians and midwives, better access to care, and above all the improvement of the social status of women. However, there remain serious deficiencies in these areas in developing countries.

5.3.1 The Conditions of Childbirth

Most childbirth-related deaths and disabilities could be prevented, since the medical solutions are well-known. The difficulty is not technical but strategic and organizational. Immediate and efficient care provided by qualified professionals during and after childbirth can save the life of the mother, since childbirth complications are largely unpredictable and can quickly become life-threatening. Most women in

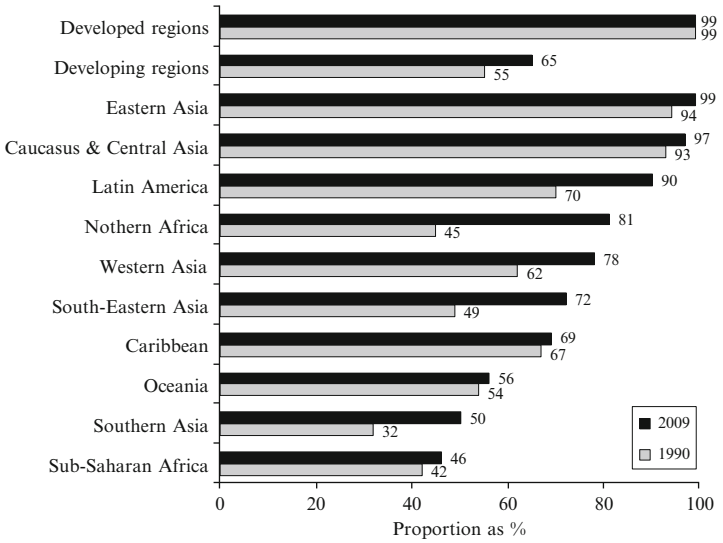

Fig. 5.6 Proportion of deliveries attended by skilled health personnel, 1990 and 2009 (%) (Source: United Nations 2011b)

developing countries, particularly in South Asia and Africa, give birth without the assistance of qualified personnel (doctors, nurses or midwives).

Many women give birth alone or with the help of a member of the family or a midwife without the skills to treat childbirth complications. This is partly explained by the fact that in most developing countries, childbirth is still widely considered to be a matter for women and a natural event, so that no medical expenses are provided for. Hospitals and clinics are unable to provide all women with the option of delivery in a medical setting.

However, there has been some progress since the 1990s. In all developing countries, the proportion of women who gave birth with the assistance of competent medical personnel rose from 53 % in 1990 to 65 % in 2009. All regions have made progress in this area, although there are wide regional variations (Fig. 5.6). Spectacular progress has been made in North Africa and South East Asia, with increases of 74 and 63 %, respectively. Today, over three quarters of all women in these regions are assisted by trained personnel during delivery. There have also been improvements in this area in South Asia, although the provision remains inadequate, with just 50 % of women giving birth with the assistance of trained personnel. The same applies in sub-Saharan Africa, where over half of all women give birth without the assistance of medical personnel. The regions with the lowest rates of medical assistance during delivery (South Asia and sub-Saharan Africa) are also those with the highest maternal mortality rates.

There are significant differences between countries or within the same country. Women living in urban areas are more likely to receive professional assistance during delivery than women living in rural areas. However, the gap has narrowed as a

result of progress in rural areas. In South Asia, women in urban areas were twice as likely to receive professional assistance during delivery as women living in rural areas in 2008, compared to three times more likely in 1990. In sub-Saharan Africa, progress has been less impressive, and the gap between urban and rural women remains wide (with women living in urban areas 2.2 times more likely to receive medical assistance during delivery).

There are also still significant differences between the richest and poorest households. In all developing regions, women from the richest households are three times more likely to receive medical assistance during delivery than women from the poorest households. In South Asia and Africa, women from the richest households are respectively five times and three times more likely to be assisted by qualified personnel than women from the poorest households. Women with a secondary or higher education are twice as likely to receive medical assistance from trained personnel as mothers with no formal education.

Countries that have made a conscious effort to ensure that mothers giving birth are assisted by trained personnel and supported by hospital services have been able to improve their maternal survival rates dramatically. One of the best documented examples[5] is Sri Lanka. Maternal mortality in this country had remained high (1,500 deaths per 100,000 live births) during the first half of the twentieth century, despite 20 years of prenatal care and the professionalization of midwifery, but access to care was limited. The maternal mortality ratio began to decline shortly after the improvement of access to care and the development of health centers throughout the country, from roughly 1947. As a result of the improvement of the quality and provision of care, the maternal mortality ratio dropped below 30 deaths per 100,000 live births in the 1990s. In Malaysia, a major maternal and infant health program has resulted in increased survival rates among mothers and newborns. At the initiative of the public authorities, a health care system was introduced in districts and obstetric care was developed through a network of 'low-risk birthing centers' based on high-quality care and benefiting from detailed and intense quality assurance audits. As a result, maternal mortality dropped to below 100 deaths per 100,000 births in roughly 1975, before subsequently decreasing to 50 deaths per 100,000 live births in the 1980s.

Similar trends have been observed in Thailand. In the 1960s, traditional midwives were gradually replaced by trained village midwives, who became central figures in the lives of many communities. In the 1980s, efforts focused on the improvement and equipment of district hospitals. Mortality decreased steadily, and by 1990, the maternal mortality ratio had dropped below 50 deaths per 100,000 births. More recently, Egypt reduced its maternal mortality rate by over 50 % in the space of 8 years, from 174 deaths per 100,000 live births in 1993 to 84 in 2000. As a result of efforts made to promote low-risk pregnancies, the number of deliveries assisted by skilled birth attendants (doctor or nurse) has doubled, while access to emergency obstetric care has improved significantly.

[5] Examples from the WHO.

These examples show that long-term initiatives and efforts can produce results and can help to reduce maternal mortality by providing mothers with care provided by qualified personnel. The reverse is also true. A breakdown of access to professional care can quickly lead to an increase of negative outcomes, as shown by the cases of Malawi and Mongolia.

It is essential to ensure that deliveries are assisted by skilled birth attendants (doctors, nurses, midwives) trained to detect problems quickly and capable of providing effective emergency obstetric care or of directing mothers to the appropriate care. There are no global data on the availability of and access to this type of care. The C-section rate can be used as an indirect indicator. The number of C-sections is currently increasing throughout the world, although they are not always justified. In the early 1990s, the high C-section rates mainly concerned Latin America. Today, the C-section rate is above 10 % in urban areas in most countries, with the exception of Africa. The C-section rate has also increased in rural areas. By contrast, the C-section rate remains low in sub-Saharan Africa, where just 3 % of women give birth by C-section – less than 5 % in urban areas and just 2 % in rural areas (WHO 2005). In these countries, the first issue to address is the lack of provision.

5.3.2 Pregnancy Care

Many of the most common health problems affecting pregnant women could be prevented or treated during prenatal consultations with qualified health professionals. Prenatal care is not only designed to identify women who may be at risk of complications during delivery, but also help women to face health problems during pregnancy. UNICEF and the World Health Organization recommend a minimum of five prenatal visits to ensure that prenatal care is effective. With good prenatal care, women are able to receive a tetanus vaccination, to undergo screening and treatment of infections and to access vital information about key warning signs during pregnancy.

Significant progress has been made in all developing regions, particularly in terms of the proportion of women with at least one prenatal visit. The percentage rose from 64 % in 1990 to 81 % in 2009. The most significant improvements have been in the regions where the percentage was lowest (Fig. 5.7). In North Africa, the proportion of women who visited a health service at least once during their pregnancy increased by 70 % between 1990 and 2009. South Asia and West Asia saw increases of almost 50 % over the same period. In 2009, in all developing regions, the proportion of women with at least one prenatal visit was above 70 %. Even in sub-Saharan Africa, where progress has been most limited, over three quarters of women now receive prenatal care at least once during pregnancy.

Once again, there are significant inequalities related to socioeconomic status, particularly in South Asia, North Africa and sub-Saharan Africa, where the proportion of women with at least one prenatal visit is around 50 % in the poorest households, compared to almost 90 % in the richest households. Even in South East Asia,

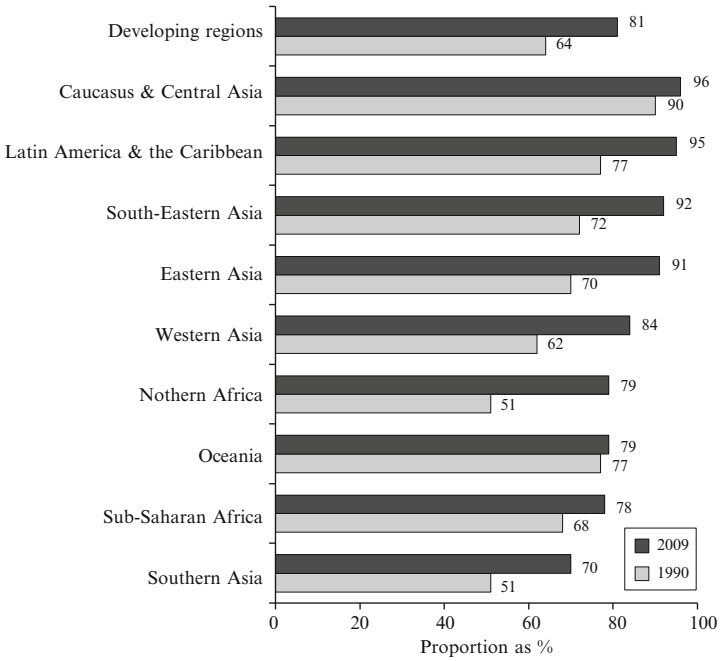

Fig. 5.7 Proportion of women (15–49 years old) attended at least once by skilled health personnel during pregnancy, 1990 and 2009 (%) (Source: United Nations 2011b)

where over 90 % of women consult qualified health professionals during pregnancy, just 77 % of women from the poorest households were covered, compared to almost 100 % of women from the richest households (United Nations 2011b).

There are also significant differences according to area of residence, although the gap narrowed between 1990 and 2009. In sub-Saharan Africa, the proportion of women in urban areas who received prenatal care at least once rose from 84 % in 1990 to 89 % in 2009, compared to 55 and 66 % for women in rural areas. Therefore, care provision has increased more rapidly in rural areas.

However, in many countries, the gap between the proportion of women receiving prenatal care at least once during pregnancy and those visiting a health professional four times during pregnancy (as recommended by international experts) remains wide. The half of all women (51 %) in developing regions visit a health professional four times during pregnancy. The available data (Fig. 5.8) indicate that these percentages remain very low in sub-Saharan Africa and South Asia, where the majority of maternal deaths occur. There has also been little progress over the last decades, which explains why maternal health has barely improved in these regions.

In rural areas, pregnancy care has declined significantly: a third of all women visit a health professional four times during pregnancy. In the rural areas of South Asia, this percentage drops to just 25 %.

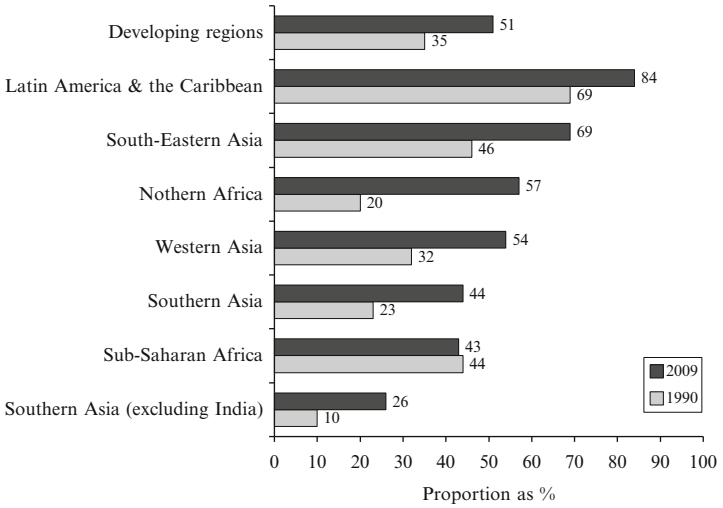

Fig. 5.8 Proportion of women (15–49 years old) attended four or more times by skilled health personnel during pregnancy, 1990 and 2009 (%) (Source: United Nations 2011b)

5.3.3 Contraceptive Use

The improvement of maternal health also requires an emphasis on the prevention of unwanted pregnancies in order to limit the number of abortions performed in unsafe conditions.

Although contraceptive use has increased throughout the world since the 1980s, significant disparities remain. Three quarters of all women of childbearing age in developed countries use a contraceptive method, compared to 60 % of women in developed regions. However, the proportion of women using contraception remains very low in sub-Saharan Africa. These averages conceal two worrying trends: the slower rate of progress since 2000 and increasing inter-regional disparities.

Over the period 2000–2008, the annual growth rate of contraceptive use was lower than the growth rate recorded in the 1990s in almost all regions (Fig. 5.9). The prevalence of contraceptive use remains particularly low in sub-Saharan Africa, where just 22 % of women use contraception. In several countries in this region, the less effective traditional methods are still widely used.

There are many issues surrounding contraception. Meeting the family planning needs of women, i.e. improving access to modern contraceptive methods for women seeking to prevent or postpone pregnancy but who do not use any form of contraception, could improve maternal health and reduce maternal mortality, and in particular the number of deaths caused by abortions performed in unsafe conditions. According to WHO estimates, maternal mortality could be reduced by 27 % every year simply by reducing the annual number of unwanted pregnancies from 75 million to 22 million. Greater use of contraception would also help to prevent frequent pregnancies and

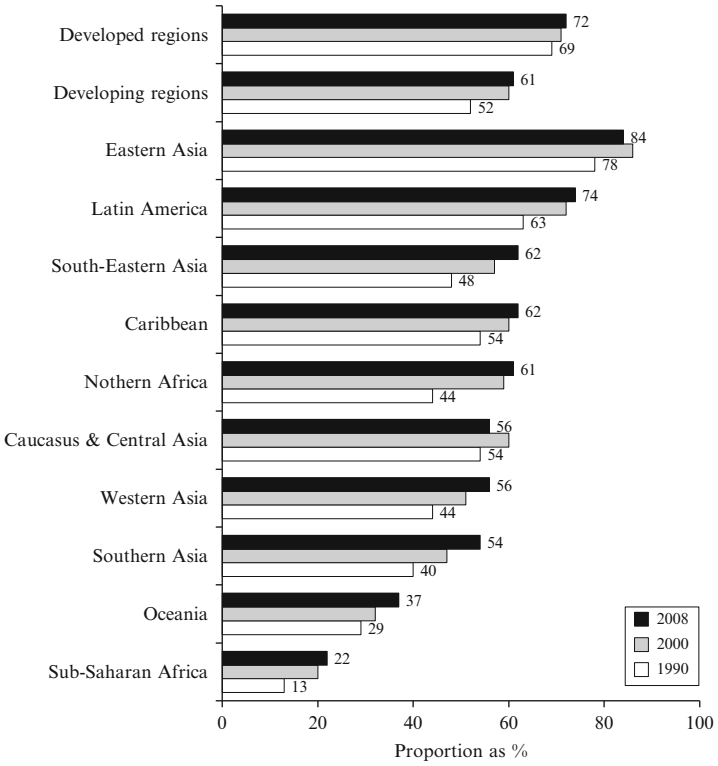

Fig. 5.9 Proportion of women who are using any method of contraception among women aged 15–49, married or in a union, 1990, 2000 and 2008 (%) (Source: United Nations 2011b)

teenage pregnancies, to improve the health of women and girls and to increase the chances of survival of their children.

Unmet family planning needs have continued to increase and are probably explained by a lack of access to contraception – a particularly significant issue for teenagers – or by the fact that women do not use them. The most commonly cited reason (45 %) for not using contraception is the feeling of not being exposed to the risk of pregnancy. The fear of side-effects and cost are referred to in a third of all cases. The refusal to use contraception is a less common cause, but remains significant, and is often attributed to the partner.

Unmet family planning needs are moderate to high in all regions, reaching 11 % throughout the developing world. In sub-Saharan Africa, a quarter of all women aged 15–49 (married or in a partnership) who expressed a desire to use contraception have no access to contraception – a level that has remained virtually unchanged since 1995. Unmet family planning needs are particularly high in the least developed countries, where limited access to modern contraception is a major cause of the persistently high fertility rates. Sixteen of the 17 least developed countries with the lowest levels of modern contraceptive use are in sub-Saharan Africa.

Ensuring access to family planning services among poor women or women with little education remains a major challenge. Studies carried out in 22 sub-Saharan African countries have shown that the use of contraception to prevent or postpone pregnancy is particularly low among women living in rural areas (17 % in the period 1999–2008), women with no formal education (10 %) and women from the poorest households (10 %) (United Nations 2010). In these countries, contraceptive use is four times higher among women with a secondary education than among women with no formal education, and is also four times higher among women from the richest households than among women from the poorest households. There has been almost no improvement in terms of the prevalence of contraceptive use among women from the poorest households and among women with no education.

Contraceptive use requires greater proximity to supply and greater social and economic access. Targeted policies and interventions supported by sufficient funds are required to ensure that even the poorest and most marginalized women are able to decide freely about the timing and spacing of pregnancies. However, the financial resources needed for family planning services and supplies have failed to keep up with demand.

5.4 Conclusion

Despite some improvements in recent decades, the health of women in developing countries remains a major concern in many parts of the world. The regions offering the best health care are also those that have achieved the most significant progress. Sub-Saharan Africa and South Asia have lost ground. A widening gap has emerged between developing countries, but also within countries. This is largely explained by the context in which health systems have developed. The gap between those who have access to care and those who do not is becoming increasingly wide. The resulting inequalities in terms of survival are even more significant among mothers. The inability of health systems to provide high-quality care during and after pregnancy also accounts for the high level of maternal mortality.

Poverty is a determinant of the health of women. When a woman dies in childbirth, it is generally as a result of a whole series of failed interactions with the health system: delayed care, failure to comply with doctors' recommendations, and, lastly, the inability of the health system to provide high-quality care when required. These deficiencies are more likely to occur, and more likely to have a combined effect (with disastrous consequences), when the social and macroeconomic context worsens.

The reduction of maternal morbidity and mortality therefore requires ensuring that all women have access to basic medical care during pregnancy, childbirth and the postpartum period, by linking communities with health centers to ensure that women have rapid access to care in the event of complications. Most deaths and disabilities are a direct consequence of delays in diagnosis, access to hospitals and the delivery of high-quality care. Universal access to care for all mothers requires a health system capable of meeting the needs and demands of the population while

offering protection against the financial costs of ill health. To achieve this, there needs to be greater investment in health systems and in the human resources required to operate them. Maternal health must be at the heart of the right to health care funded by universal coverage. In order to achieve these targets, many countries will need to use mixed funding systems supported by external and internal resources, but will only succeed with greater international support and solidarity. It is only on these conditions that the obstacles preventing so many mothers from accessing basic health care will be overcome, resulting in a lack of access to essential care from pregnancy to childbirth and through the neonatal period. Good maternal health is a requirement for individuals and a necessity for society (WHO 2005).

The provision of care and treatment for pregnancy and childbirth-related risks is inextricably linked to the status of women in society. A woman learns in childhood that in order to be respected as a wife and mother, she must always obey her husband and sons and endure any health issues without complaint (Maia 2004). Irrespective of the health conditions affecting her, a woman must continue to look after her children and to perform household chores and fieldwork. Women act as parents responsible for ensuring the survival of the species, but gain no social recognition from their role. Maternal health is determined by the link between general living conditions and health systems. It would be an illusion to think that significant progress could be made in maternal health by acting exclusively on living conditions or health systems, but not both (Vaillant and Salem 2008). Whenever women are denied the right to decide for themselves on reproductive health matters, the difficulty of access to family planning services limits their capacity to space births and to protect their health and life. In this sense, maternal health is at the heart of the development process.

Pregnancy and childbirth-related deaths differ from other types of death. They affect young women, not as a result of illness or disease, but in the course of a natural process involving the transmission of life. In addition to death, maternal mortality also has a significant social impact. The family loses the contribution of the mother to the running of the household and the care provided to the children. Children are the most affected, particularly girls. Children with no mother are six times more likely to die in the 2 years following the death of their mother than children living with their mother (Maia 2004). In the least developed countries, the reduction of maternal mortality is a key factor for the survival and development of children up to adolescence. Therefore, investing in human resources is a sound development policy.

The urgency is all the greater because, as progress has been slower than anticipated, the reduction of deaths has been partly offset by population growth. The number of premature maternal deaths could well be increasing since, although the rates are declining, the number of mothers and births has continued to increase. Throughout the world, the number of live births is expected to reach 138 million per year around 2015, i.e. almost 2 million more than today (World Population Prospects, the 2010 revision). This increase will occur mostly in sub-Saharan Africa and in certain regions of Asia – regions where childbirth presents the highest risk and where maternal mortality as a result of unsafe abortions is highest.

Chapter 6
Morbidity: A Double Burden for Developing Countries

The easiest way to measure population health is to use mortality data. However, mortality data tend to underestimate the non-fatal consequences of disease. The combination of different indicators such as life expectancy and healthy life expectancies has resulted in new methods being developed over the last 20 years to measure the global burden of disease. Although they are at different stages of the health transition, many countries have already begun to apply these methods, which are increasingly being used by international organizations such as the World Health Organization as tools for measuring health. The vast amount of work aimed at providing a comprehensive quantification of the global burden of disease has radically changed our view of certain health conditions and has drawn our attention to the burden of injury. As a result, we now have more credible measures for monitoring global health trends. Health and quality-of-life indicators have become indispensable for describing and monitoring population health, for assessing the impact of health care on individuals, and for conducting economic evaluations of health care programs.

The indicator of the burden of disease based on the number of disability-adjusted life years (DALYs) takes into account both the number of years of life lost (YLLs) due to premature death and the number of years lived with disability (YLDs). 'One DALY can be thought of as one lost year of "healthy" life and the measured disease burden is the gap between a population's health status and that of a normative global reference population with high life expectancy lived in full health' (WHO 2003: 5). The number of years of life lost is calculated based on the highest life expectancy in the world (currently 86 for women and 79 for men, in Japan). The reduction of healthy life expectancy takes into account the seriousness of the disease and the age of the affected person. The total number of disability-adjusted life years (calculated by country and by pathology) provides the global burden of disease.

The most recent study by the WHO (2008) estimated the global burden of disease in 2004 at over 1.523 million DALYs.[1] The global burden of disease has

[1] Latest data provided by the Global Burden of Diseases:
http://www.who.int/healthinfo/global_burden_disease/2004_report_update/en/index.html

M. Gaimard, *Population and Health in Developing Countries*, Demographic Transformation and Socio-Economic Development 2, DOI 10.1007/978-94-007-6793-5_6,

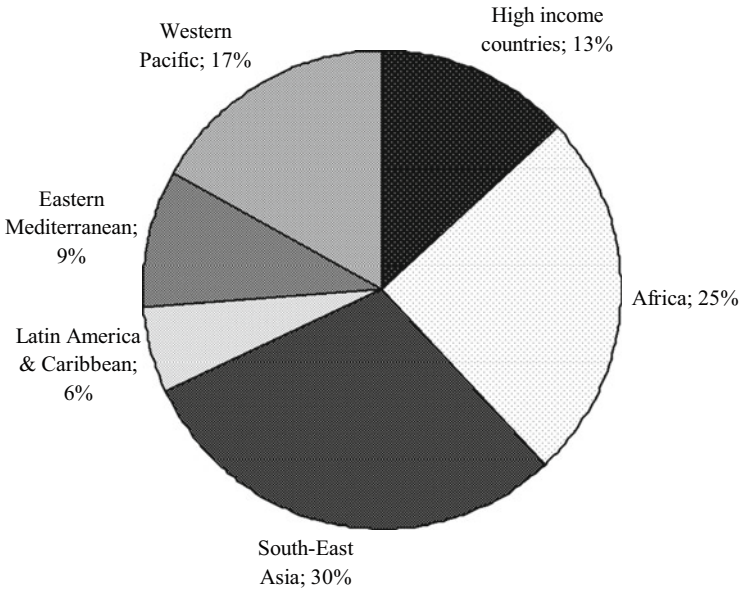

Fig. 6.1 Burden of disease by WHO region (Source: Global Burden of Diseases, WHO 2008)

remained relatively stable since 1999. Developing countries account for 87 % of the global burden of disease (Fig. 6.1). Africa and Southeast Asia account for 55 % of the global burden of disease, despite representing just 40 % of the world population. The WHO Western Pacific Region is the developing region with the lowest burden. This is explained by the fact that countries (such as China) now have a similar life expectancy to Latin American countries and (in some cases) higher life expectancies than some European countries.

Based on the size of different populations, the impact rate is obtained by estimating the burden of disease per 1,000 people. At a global level, the rate of impact is 237 DALYs per 1,000 people (1.523 billion/6.437 billion), meaning that in 2004, each person lost on average 0.237 DALY – i.e. approximately 3 months of disability-free life expectancy. The impact rate varies widely from one region to another (see Fig. 6.2) and is highest in Africa, reaching over 510 DALYs per 1,000 people, or approximately 6 lost months of disability-free life – double the global average and three times more than in developed countries. The rate of impact is also high in Southeast Asia (265 DALYs per 1,000 people) and the Eastern Mediterranean (273 DALYs per 1,000 people).

Sixty percent of the global burden of disease is due to premature deaths and 40 % to non-fatal disabilities. The impact of premature mortality varies significantly from one region to another. In Africa, the premature death rate is seven times higher than in developed countries, representing 75 % of the burden of disease. The differences related to morbidity per se are less pronounced. For example, in Africa, the rate is 80 % higher than in developed countries. The populations of developing countries

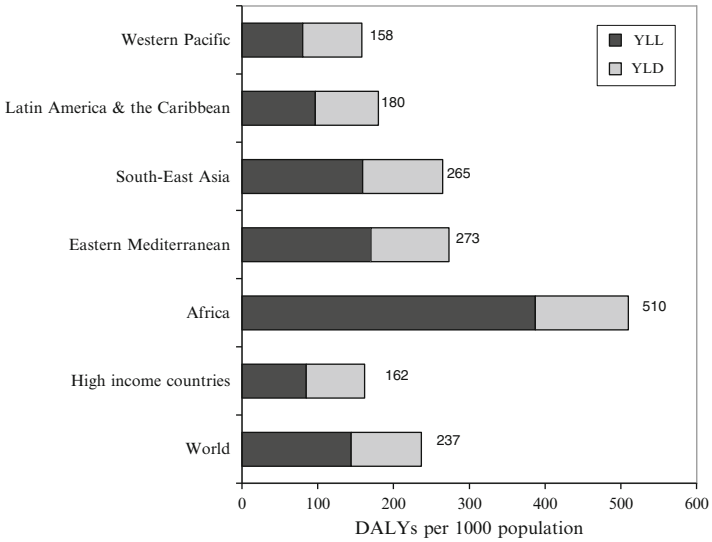

Fig. 6.2 DALYs rate, YLL and YLD by WHO region (per 1,000 people) (Source: Global Burden of Diseases, WHO 2008)

not only have a lower life expectancy than in developed countries, but also spend a greater proportion of their life in poor health. Healthy life expectancy varies in different regions to a greater extent than total life expectancy, ranging from 45 in sub-Saharan Africa to over 71 in Western Europe. The gap between total life expectancy and healthy life expectancy represents the number of lost years of good health in a population as a result of poor health. The gap ranges from 9 % in the Europe and Western Pacific Regions to 15 % in Africa.

Globally, over a third of the total number of healthy years lost (36 %) are due to diseases among children under 15, while almost half are due to diseases among adults aged 15–59. While child survival in developing countries remains a major health concern, a significant proportion of the burden of disease and injury is borne by the adult population and is tending to increase. Children under 5 and adults account for a third and 48 % of DALYs respectively, while in developed countries children under 5 account for just 5 % of DALYs.

The distribution of the burden of disease based on the three major categories of causes defined by the WHO indicates that 40 % of DALYs throughout the world are due to communicable, perinatal, maternal and nutritional conditions, while 48 % are due to non-communicable diseases and 12 % to injuries (see Table 6.1). The distribution of the burden of disease differs significantly between developed and developing countries.

In the developing world, communicable diseases and perinatal, maternal and nutritional conditions weigh more heavily, representing 43 % of DALYs, compared to 6 % in developed countries. Non-communicable diseases also account for 43 % of DALYs, compared to 85 % in developed countries. In regions of Africa where the

Table 6.1 Burden of disease (DALYs) by broad cause group

Broad cause group	Proportion of DALYs (%)			DALYs rate (per 1,000 population)		
	LMI*	H.I*	World	LMI*	H.I*	World
Communicable diseases, maternal, perinatal and nutritional conditions	42.6	6.0	39.7	109	7	94
Communicable diseases	*20.9*	2.2	19.4	54	3	46
Perinatal, maternal and nutritional diseases	*21.7*	3.8	20.3	56	5	48
Noncommunicable diseases	44.8	84.8	48.0	115	106	114
Injuries	12.6	9.2	12.3	32	12	29
Total	100	100	100	257	125	237

Source: Global Burden of Diseases, WHO (2008)
*LMI** low and middle-income countries, *HI** high-income countries

Table 6.2 Years of life lost (*YLL*) due to deaths by broad cause group

Broad cause group	Proportion as %			YLL rate (per 1,000 population)		
	LMI*	H.I*	World	LMI*	H.I*	World
Communicable diseases, maternal, perinatal and nutritional conditions	54.1	7.7	51.4	87	4	74
Communicable diseases	*28.7*	*3.0*	*27.3*	*46*	*2*	*39*
Perinatal, maternal and nutritional diseases	*25.3*	*4.7*	*24.1*	*41*	*3*	*35*
Noncommunicable diseases	31.5	76.9	34.1	51	42	49
Injuries	14.4	15.4	14.5	23	8	21
Total	100	100	100	97	70	93

Source: Global Burden of Diseases, WHO (2008)
*LMI** low and middle-income countries, *HI** high-income countries

AIDS epidemic has made the demographic transition more complex, communicable diseases can account for up to 60 % of the total disease burden.

The rate of impact is higher in developing countries for all categories of causes, including non-communicable diseases. While the gap between developed and developing countries is relatively narrow in the case of non-communicable diseases, the difference in terms of communicable diseases and perinatal, maternal and nutritional pathologies is significant, with an impact rate 15 times higher in developing regions.

A comparison of the distribution of the leading causes of years of life lost due to death (see Table 6.2) and disability-affected life years (see Table 6.3) shows that communicable diseases and perinatal, maternal and nutritional conditions on the one hand and injuries on the other have a greater impact on mortality than on morbidity. The reverse applies to non-communicable diseases, which have a greater impact on morbidity. The former are essentially associated with deaths, while the latter are a major cause of disability.

Table 6.3 Years of life lost to disability (*YLD*) by broad cause group

	Proportion as %			YLD rate (per 1,000 population)		
Broad cause group	LMI*	H.I*	World	LMI*	H.I*	World
Communicable diseases, maternal, perinatal and nutritional conditions	23.0	4.6	20.9	22	3	19
Communicable diseases	*8.9*	*1.6*	*8.0*	*9*	*1*	*7*
Périnatal, maternal and nutritional diseases	*14.1*	*3.0*	*12.8*	*14*	*2*	*12*
Noncommunicable diseases	66.4	91.1	69.2	64	63	64
Injuries	10.6	4.3	9.9	10	3	9
Total	100	100	100	161	55	145

Source: Global Burden of Diseases, WHO (2008)
*LMI** low and middle-income countries, *HI** high-income countries

Lifestyle changes in the second half of the twentieth century amid rapid population growth had a significant impact on the appearance or resurgence of infectious and parasitic diseases such as cholera, malaria, yellow fever, dengue fever, diphtheria, and conditions related to antibiotic-resistant bacteria. New diseases have also spread, such as AIDS. In addition to the significant burden of communicable diseases in the developing world, non-communicable diseases are also spreading rapidly, representing over half of the disease burden in these regions. Developing countries are thus faced with a double burden of disease.

6.1 Communicable Diseases and Nutritional Disorders

The leading causes of morbidity in developing countries include communicable diseases and perinatal, maternal and nutritional conditions, which account for roughly the same proportion of the burden of disease. The near totality of the communicable disease burden is due to diarrhea, malaria, tuberculosis, measles, pneumonia, and HIV/AIDS, in addition to many other parasites and viruses. This chapter will not examine the perinatal and maternal conditions studied in Chap. 5. Neither will it focus on childhood diseases such as measles, whooping-cough and tetanus, which are examined in Chap. 4 (in the context of infant and child mortality).

Infectious and parasitic diseases, which represent a heavy burden for developing countries, are communicable diseases caused by microorganisms – bacteria, parasites or viruses (Khlat and Le Cœur 2002). Bacteria and viruses are transmitted directly from human to human through a specific vector (generally an insect). In Africa, HIV/AIDS is the leading cause of morbidity, accounting for over 12 % of DALYS, followed by lower respiratory infections (11 % of DALYs) and diarrheal diseases (9 %). In other developing regions, particularly Asia and the Eastern Mediterranean, acute lower respiratory tract infections are the leading cause of morbidity, accounting for 6–8 % of DALYs, followed by diarrheal diseases (5–6 %).

New diseases (such as cholera, dengue fever, yellow fever, and diphtheria) have developed as a result of the increased resistance of parasites to drugs and pesticides. The two major infectious diseases in developing countries are malaria (8 % of DALYs in sub-Saharan Africa) and tuberculosis. The HIV/AIDS epidemic will be examined in part two of this chapter.

6.1.1 Malaria

Malaria remains the most common parasitic disease transmitted by infected anopheles mosquito bites. Malaria causes acute fever which, if left untreated, can be fatal. The size of the area affected by malaria has shrunken considerably over the last 50 years, although there has been a slight recrudescence in recent years. Programs for the eradication of malaria were put in place in the 1950s based on a synthetic antimalarial drug, chloroquine, and the discovery of DDT, an effective insecticide. Significant progress was made toward eradicating malaria until the late 1960s, with a significant decrease in the prevalence of malaria in Mediterranean and Asian countries. However, mosquitoes eventually developed a resistance to drugs and pesticides, causing a recrudescence of malaria. The number of cases of malaria increased in the 1990s, particularly in Africa, despite the development of prevention measures.

Today, the main endemic area is sub-Saharan Africa. According to the Millennium Development Goals Report, half of the world population is at risk of contracting malaria (United Nations 2010). There are between 350 and 500 million new cases of malaria every year, predominantly among children. The most affected countries are the poorest countries: of the one million deaths caused every year by malaria, 90 % occur in sub-Saharan Africa, where 2,000 children die of malaria every day. The epidemic is unstable in Asia and Latin America, and there are epidemics in South Asia (6 % of malaria episodes in 2006) and Southeast Asia (3 % of episodes) and in some regions of the Middle East. The highest risks in sub-Saharan Africa are related to a number of factors: the transmission of the disease is more intense, the deadliest form of the parasite is more common, and the region has less effective health care systems. Malaria is a disease of poverty, with malaria cases and deaths found predominantly in the least developed countries.

Malaria mainly affects young people and pregnant women and accounts for 10 % of deaths among children under 5 years of age in the developing world and for up to 20 % in sub-Saharan Africa. Of the total number of malaria deaths, almost 80 % are among children under 5. In addition to causing death, malaria can also have a serious impact on the mental and physical development of children. Among semi-immune women, malaria can cause up to 60 % of fetal deaths and over 10 % of maternal deaths. In adults, malaria can have debilitating effects, forcing people to take leaves of absence from work for several days and even several weeks. The disease also has a significant economic impact. Malaria leads to an average loss of 1.3 % of annual economic growth in the worst affected countries (Vaillant and Salem 2008). The economic impact of malaria is significant for both families and the authorities

Table 6.4 Proportion (%) of children under five sleeping under an insecticide-treated bed net or receiving antimalarial medicine, in Sub-Saharan Africa (2006–2009)

Household	Proportion of children sleeping under an insecticide-treated bed net (%)	Proportion of children receiving antimalarial medicine (%)
Richest 20 %	23	46
Fourth 20 %	19	40
Middle 20 %	17	35
Second 20 %	16	32
Poorest 20 %	14	27
Rural areas	19	30
Urban areas	20	41

Source: United Nations (2010)

because of the loss of productivity, school and work absenteeism, and the high cost of health care. 'Malaria-related spending can represent up to 40 % of public health spending, 30–50 % of hospitalizations and up to 60 % of external consultations. Over several years, this loss generates substantial differences in GDP between malaria-affected and non-affected countries' (Vaillant and Salem 2008: 34).

Consistent disease control is a prerequisite for eradicating malaria. In recent years, there has been a significant increase in international funds. The available data show that there has been significant progress in terms of prevention and treatment. One of the means of preventing malaria (considered to be the most effective means of prevention) is to use insecticide-impregnated mosquito nets. A number of African countries have promoted and extended the use of insecticide-impregnated mosquito nets. However, very few countries have achieved a 60 % coverage rate, the target set for 2005 at the 'Roll Back Malaria' Summit in Africa. In addition, the revised target of 80 % of use of insecticide-impregnated mosquito nets in 2010 has yet to be reached. The global production of mosquito nets quintupled between 2004 and 2009, rising from 30 to 150 million. Between 2007 and 2009, nearly 200 million mosquito nets ready for use were imported into African countries. According to these estimates, the number of mosquito nets available in African countries will mean that half of the total population exposed to malaria will be covered. According to the WHO, 350 million nets are required to cover the entire population across the region.

The use of insecticide-impregnated mosquito nets to protect children under 5 years of age has increased spectacularly in sub-Saharan Africa – from 2 % in 2000 to 22 % in 2008, according to data from 26 African countries covering 71 % of African children (United Nations 2010). In 20 of these countries, the coverage rate more than quintupled between 2000 and 2008 and increased at least tenfold in 11 countries. The increased coverage rate of children has been accompanied by a reduction in the gap between households. The data provided by approximately 30 African countries covering 85 % of children under five indicate a more equitable distribution in poor rural households, although not all households have benefited from these improvements (Table 6.4). The children of poor rural families are on average less likely to have a mosquito net, although there is no significant difference between girls and boys.

When the disease breaks out, rapid and effective treatment is essential to prevent fatal complications, particularly among children. Purchases of artemisinin-based combination therapies,[2] a more effective but also more expensive treatment, have increased significantly since 2004. However, the coverage of antimalarial treatment varies widely from country to country – from 67 % to 1 % of children under five with fever. The proportion of children under five with fever receiving antimalarial drugs was below 50 % in eight of the 37 African countries with recent data (2006–2009). In nine of these countries, just 10 % of children received anti-malarial treatment. Children in rural areas were less likely to receive antimalarial drugs than children in urban areas, while the children from the richest families were almost twice as likely to receive drugs as the children from the poorest families.

In Africa, those countries that have achieved a high coverage rate in terms of mosquito nets and treatment programs have seen a decrease in the number of cases of malaria (50 % in Eritrea, Rwanda and Zanzibar). Cost is a major obstacle to the use of effective drugs against multi-resistant malaria. Additional funds are needed to ensure progress in this area. In 2010, the United Nations estimated at six billion dollars the funds required to implement malaria control interventions at a global level. The prospects for the development of a vaccine remain uncertain.

6.1.2 Tuberculosis

Though thought to have been eradicated, tuberculosis has recently reappeared in connection with the AIDS epidemic. In most cases, TB is a curable disease. An individual may be infected with the bacillus, be contagious and not contract the disease. TB affects the most productive age groups, i.e. adults, and is often associated with malnutrition and poor living conditions.

Nearly two billion people worldwide are currently infected with tuberculosis. Every year, between eight and ten million people contract the disease and nearly two million die of tuberculosis. In 2008, there were 11 million reported cases of tuberculosis worldwide, including over 80 % in sub-Saharan Africa and Asia. India, China, Indonesia, South Africa and Nigeria have the highest number of TB cases. The prevalence of the disease, i.e. the number of cases per 100,000 people, is 164 worldwide, but 210 per 100,000 in developing regions, compared to 8.5 per 100,000 in developed countries. The highest prevalence rates are found in sub-Saharan Africa (490 per 100,000), Southeast Asia (290 per 100,000), and South Asia (220 per 100,000). The prevalence of the disease is decreasing in all regions, albeit at different rates, except in some countries of Asia and sub-Saharan Africa, where it has increased by 63 %, rising from 300 cases per 100,000 in 1990 to 490 per 100,000 in 2008 (Fig. 6.3). In sub-Saharan Africa, AIDS is the main determinant of the increased prevalence of TB over the last 20 years.

[2] Artemisinin and its derivatives (derived from qinghaosu), a traditional Chinese medical plant, have been shown to be remarkably effective for treating malaria.

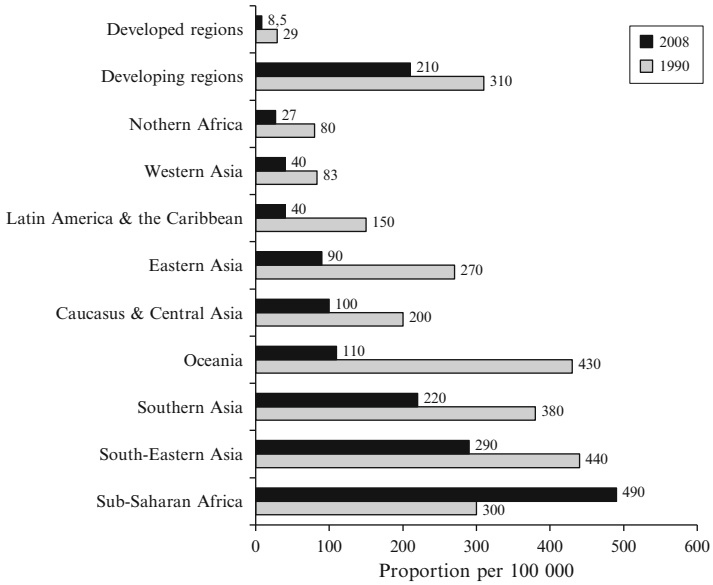

Fig. 6.3 Tuberculosis prevalence (per 100,000 population) by WHO region, 1990 and 2008 (including people who are HIV-positive) (Source: United Nations 2010)

After reaching a peak in 2004, the global incidence of tuberculosis (the number of new cases per 100,000 people) appears to have declined, with the incidence rate dropping from 143 cases per 100,000 people in 2004 to 139 in 2008. In 2008, the number of people diagnosed with TB was 9.4 million. Although the incidence rate has decreased, the number of new cases has increased significantly year after year (8.3 million in 2000) as a result of population growth. The majority of TB cases are in Asia (55 %) and Africa (almost a third). The WHO estimates that 15 % of reported cases are among HIV-positive people. The 2007 WHO report noted that the sex ratio of cases was 1.8 men for every woman, meaning that men are almost twice as affected as women. One of the explanations given by the WHO is that 'in some age groups, the biological differences between the sexes have an effect on the risks of infection or progression to the active stage of the disease'. The different social roles of men and women are thought to have an impact on exposure to risk and access to care.

Although an increasing number of TB patients recover from the disease, millions of people still have no access to high-quality care. Almost two million people died of tuberculosis in 2008, half of whom had AIDS. AIDS and tuberculosis have a mutual impact on the development of the disease. An infected HIV-positive person is more likely to contract tuberculosis than an infected but HIV-negative person. A third of AIDS patients are also infected with TB. Tuberculosis mortality rates have decreased since 2003 in sub-Saharan Africa, although they have yet to return to the lowest levels of the 1990s. The incidence of the disease is becoming stable and the global tuberculosis epidemic appears to be on the point of declining. However, the progress made in this area has not been sufficiently rapid to reach the

targets set by the 'Stop TB' Partnership aimed at reducing by half the prevalence of tuberculosis and tuberculosis mortality rates between 1990 and 2015. Given recent trends, it is highly unlikely that sub-Saharan African will reach this target.

6.1.3 Nutritional Disorders

In the developing world, the pathologies associated with nutritional health account for a significant proportion of the burden of disease and are a leading cause of death, particularly among children. Nutritional health is often used to measure population health. Low height-for-age and/or low weight-for-height are indicative of social and environmental conditions, eating habits, and access to preventive and curative care. Malnutrition leads to a high prevalence of low birth weight.

In public health, the most common indicator used to measure nutritional health is the body mass index (BMI). The body mass index is the ratio between weight and height, calculated by dividing body mass by the square of the height. Several categories are defined based on the level of BMI: underweight (BMI below 19), normal (BMI between 19 and 25), overweight (BMI between 25 and 30), and obese (BMI above 30). BMI is adjusted for age since ageing is associated with weight gain. Other indicators can be used, including the weight of the baby at birth and the waist-to-hip ratio for adults.

Developing countries generally have a high prevalence of underweight, while developed countries are more affected by overweight and obesity issues. A nutrition transition model has been developed in recent years, in a similar way to the demographic transition and the epidemiological transition. The different stages of the transition are assumed to be indicative of the level of development. However, local circumstances are more complex. High prevalence rates of underweight and low-height-for-age in children and low weight in women are almost the preserve of poor countries, particularly in sub-Saharan Africa, while a high prevalence of child and adult obesity is more common in developed and emerging countries. In some developing countries (Liberia, Namibia, Mozambique, Egypt), there is a triple burden associated with nutritional health: underweight children, child obesity and adult obesity.

Low weight-for-height in newborns is a sign of acute malnutrition and can often lead to death (see the paragraph on child mortality in Chap. 4). In 2005, 10 % of children (55 million) in the developing world were affected by this issue. The majority of these children will die before the age of five. The rate is above 20 % in Southeast Asia. Delayed growth affects approximately 178 million children, i.e. a third of all children in the developing world. Among these, 40 % live in Africa and Southeast Asia, 25 % in the Middle East, and between 10 and 15 % in Latin America and the Pacific Islands.

A number of factors (not necessarily medical) combine and interact to account for delayed growth. Vaillant and Salem refer to the example of Mozambique, where a 2003 demographic survey showed that the main factors contributing to the differences in the prevalence of low height-for-age among children were access to

drinking water (19 % of cases), the level of household income (17 %), area of residence (16 %) and the activity of the mother (13 %). Other factors account for 35 % of cases. These factors are often found in combination, with extreme poverty often being correlated with unfavorable living conditions (Vaillant and Salem 2008).

Children are not the only group affected by poor nutritional health. In 2005–2007, 16 % of the population in the developing world were undernourished (the most recent period for which the WHO has data). There has been some progress since 1990–1992 (when the proportion of undernourished people was 20 %), although the situation has remained stable since 2000–2002. However, the number of undernourished people is currently on the increase (830 million people in 2005–2007 compared to 797 million in 1995–1997). The rise in food prices in 2008 and the 2009 financial crisis probably contributed to worsening the situation. The United Nations estimates that there were possibly as many as 915 million undernourished people in 2008 and over a billion in 2009. The region with the highest proportion of undernourished people is sub-Saharan Africa (26 % of the population), followed by South Asia (approximately 20 %), Southeast Asia (14 %), East Asia (11 %) and Latin America (9 %).

In developing countries, undernourishment and malnutrition are often compounded by micronutrient deficiencies, particularly in iodine, iron, vitamin A and zinc. Across the world, 2.2 billion people are at risk of iodine deficiency, which causes endemic cretinism (a form of mental retardation). Estimates suggest that over a million people have a goiter, the most spectacular sign of an iodine deficiency. The disorders caused by this deficiency account for 2.5 million DALYs (0.2 % of total), including 25 % in Africa, 17 % in Southeast Asia, and 16 % in the Eastern Mediterranean Region. According to WHO estimates, iron deficiency affects two billion people across the world. Young children and pregnant and recently pregnant women are the worst affected groups since children and pregnant women have particularly high requirements, although an iron deficiency can occur at any age. In its most serious form, an iron deficiency causes slight mental retardation. In total, iron deficiency accounts for 800,000 deaths worldwide (1.5 % of total) and 35 million years of healthy life lost (2.4 % of total), including 36 % in Southeast Asia, 29 % in Africa and 12 % in the Western Pacific. Vitamin A deficiency has the greatest impact on children and women of childbearing age (see Chaps. 4 and 5). Across the world, vitamin A deficiency causes almost 800,000 deaths and 26 million DALYs (1.8 % of total). Africa and Southeast Asia are the worst affected regions. Based on the available data, one third of the world population has a zinc deficiency, although up to 75 % of the population in developing regions can be affected. Zinc deficiency accounts for roughly 18 % of malaria cases, 16 % of lower respiratory infections and 10 % of diarrhea cases, mainly in Africa, Southeast Asia and the Eastern Mediterranean. In total, 1.4 % of deaths and 2.9 % of DALYs (28 million) are caused by a zinc deficiency, including 50 % in Africa and 34 % in Southeast Asia.

The geography of nutritional health is just as much a matter of social organization and cultural specificities as it is a sign of development in the strict sense of the term. Like the current and future geography of the planet, the geography of nutritional health remains uncertain (Vaillant and Salem 2008).

6.1.4 Other Communicable Diseases

According to the WHO, one quarter of the world population (living in developing regions) is affected by chronic intestinal parasites. Although they are rarely a direct cause of death, intestinal parasites have negative effects on child growth and are a major factor of malnutrition. The fight against chronic intestinal parasites involves environmental sanitation, health education and systematic screening of children in health care systems.

Schistosomiasis (or bilharziasis) is a water-borne parasitic disease. As a result of large dams, the disease has spread to many countries in Latin America, Asia and sub-Saharan Africa and has become the second parasitic tropical disease after malaria, despite the existence of simple and effective treatments. Schistosomiasis is a major cause of limitation of activity and, in the long term, can cause severe kidney infections and bladder cancer.

Leishmaniasis is another major parasitic disease affecting developing countries. Leishmaniasis is transmitted by certain species of sand flies, a type of mosquito. In its cutaneous form, the disease is mainly found in Latin America, around the Mediterranean, in South Asia and in sub-Saharan Africa (in its visceral form, which is more serious). The number of people living in endemic areas is estimated to be 350 million. Over 90 % of cases of visceral leishmaniasis in the world are found in India, Bangladesh, Nepal, Sudan and Brazil.

Filariasis is also very common in tropical regions. Filariasis is a disease caused by parasitic worms called filariae and is transmitted by an insect vector. Onchocerciasis (or river blindness) is the most serious type of filariasis, affecting 37 million people, mainly in sub-Saharan Africa, in addition to some sources in Latin America. Onchocerciasis is the leading cause of blindness in infested areas and the second leading cause of infectious blindness in the world. Lymphatic filariasis also causes an incapacitating disease, elephantiasis, with symptoms including limb swelling or an increase in the size of a part of the body caused by an edema. In 2008, over 695 million people were affected by this type of filariasis, common in tropical regions. Only 496 million of these people received treatment. A vast program has been undertaken by the WHO to treat over a billion people with the aim of eradicating these filariasis.

Human trypanosomiasis is found in an endemic state in Africa in the form of sleeping sickness and in the form of Chagas disease in South America. The WHO estimates that over 60 million people are exposed to sleeping sickness and that between 50,000 and 70,000 people are infected every year. If left untreated, the disease can be fatal, with a gradual mental deterioration leading to coma and death. At the neurological stage of the disease, the effects can be irreversible. According to recent estimates, sleeping sickness causes a loss of life expectancy of 9–10 years among two million people. Chagas disease is a serious health problem in Latin America, particularly in poor rural areas, and currently affects between eight and ten million people, while a further 100 million people (a quarter of the population of Latin America) are at risk of contracting the disease. According to the WHO,

nearly 13,000 people die of Chagas disease and 300,000 new cases are reported every year.

Bacterial diseases other than diarrheal diseases, tuberculosis and AIDS are also common in developing regions. Among them, cholera is a particularly serious diarrheal disease found in an endemic state in 80 developing countries. In 2008, nearly 200,000 cases of cholera were reported by the WHO, 85 % of which were in Africa (WHO 2010b). Epidemics can also break out sporadically, often as a result of ecological disasters, such as after the earthquake in Haiti in 2010.

The tropics are particularly affected by hepatitis B, the most dangerous viral disease in the hepatitis group. Hepatitis B can cause cirrhosis of the liver, which can be fatal, and primitive liver cancer. Throughout the world, there are nearly 70 million new cases every year, particularly in Africa, the Far East and the Pacific. Systematic hepatitis B vaccination of newborns is already standard practice in many countries. The hepatitis C virus is also a major public health issue in the developing world. According to the WHO, 3 % of the world population is infected and 170 million people are thought to be chronic carriers, i.e. five times more than the number of HIV-infected people. As with hepatitis B, chronic carriers of the hepatitis C virus are at risk of cirrhosis and liver cancer. As yet, there is no effective vaccine.

There has been an increase in the number of cases of dengue fever (part of the arbovirus group), and in particular hemorrhagic dengue fever, as a result of urbanization. In the absence of any vaccine, the main control strategy today is anti-vector control. Yellow fever is also on the rise in Africa and Latin America, with the rise of epidemic causing thousands of deaths.

Leprosy is found in an endemic state in Southeast Asia and, to a lesser extent, in Latin America and Africa. The WHO reported over 250,000 cases of leprosy throughout the world in 2008, including nearly 70 % in Southeast Asia. Following the implementation of a polychemotherapy protocol, the global prevalence of leprosy has declined in recent years (5.2 million cases in 1985). Poliomyelitis, previously a leasing cause of paralysis in children in the developing world, is on its way to being totally eradicated. Today, there are just seven countries still affected by poliomyelitis (Pakistan, Afghanistan, India, Egypt, Somalia, Niger and Nigeria). In 2006, 1,760 cases were reported, including 1,000 in Nigeria and 500 in India.

6.2 The HIV/AIDS Epidemic

Sexually transmitted diseases (STDs) are poorly reported in most countries. STDs are a serious public health issue and are becoming increasingly common in developing countries. AIDS is a particular case among STDs in view of its gravity and rapid spread.

Worldwide, the acquired immunodeficiency syndrome (AIDS) is the leading cause of infectious disease-related deaths among adults. Since the fourteenth-century bubonic plague, no other pathogenic agent has been as devastating as AIDS (WHO 2003). In the worst affected regions, and in particular in some of the poorest

countries of the world, AIDS has contributed to offsetting the gains in life expectancy achieved in the final decades of the twentieth century. Since its appearance, AIDS has killed at least 30 million people throughout the world. The WHO reported that 34 million people were infected with AIDS in 2010. The highest morbidity burden is in Africa, where the epidemic has worsened as a result of a number of factors, including general poverty, gender inequalities and health system deficiencies.

6.2.1 The Spread of the Epidemic

AIDS was first described in 1981, when the first cases appeared in large American cities. In 1984, similar cases were reported in Africa, and subsequently in the Caribbean and Europe. Transmitted by the human immunodeficiency virus (HIV), one of the deadliest epidemics in the history of mankind had emerged. Across the world, HIV is transmitted by a relatively limited number of mechanisms. Originally, HIV was linked to a virus in monkeys in Africa and transmitted to humans, with the virus adapting to humans. The virus was transmitted to humans several times in different parts of the world. The virus mutates rapidly and develops a resistance to the immune system response to vaccination. Three groups of HIV are at the root of the problem: M, N and O, two of which are well known. The HIV-1M group, the cause of the current pandemic, is found all over the world. The second group, or HIV-2, is only found in West Africa. HIV-1 is the most serious form of the disease. If left untreated, roughly half of all infected adults develop the disease 8–10 years after contamination, with the near totality of patients dying within 1–2 years.

There are nine genetic subtypes within the different groups. The subtypes of the pandemic virus (HIV-1) involve a distinction between two epidemic strains in different areas of the world. Subtype B, transmitted sexually and through blood, is developing in large American cities and in other closely related countries, including Haiti, Brazil, South Africa and Australia. However, it is also found in Europe and is currently spreading in East Asia. The non-B subtype, transmitted sexually, is found in Central and East Africa, but also in Zambia, Zimbabwe, and Europe, at the crossroads of the two subtypes. The geographic distribution of subtypes of HIV is constantly changing, and the pandemic is one of the most spectacular manifestations of the current world system. In the era of mass air transport and increased mobility (of all types), the potential scale of the disease is greater than any other in history (Vaillant and Salem 2008).

The spread of the epidemic has divided the world in two – the poor and the rich. There are also two models of the pandemic: generalized epidemics in many countries of sub-Saharan Africa and, in the rest of the world, targeted epidemics affecting particular groups, i.e. those at greatest risk of infection (homosexuals, injecting drug users, sex workers).

The most recent epidemiological data from the WHO indicate that of the 34 million people living with AIDS, 23 million (i.e. almost 70 %) are in sub-Saharan Africa. The spread of AIDS in the world appeared to reach a peak in

1996, with 3.5 million new infections (WHO-UNAIDS 2010). By 2010, the annual number of new infections had declined to around 2.7 million. AIDS-related mortality has also declined, with the number of deaths dropping from a peak of 2.2 million in 2004 to 1.8 million to 2010. These positive trends are largely due to the drop in the annual number of new infections in some countries of Asia, Latin America and sub-Saharan Africa. By contrast, infection rates have continued to increase in other parts of the world, notably Eastern Europe and Central Asia. The decline in the incidence of the disease is related to the increased access to antiretroviral drugs in the poorest countries. People infected with the virus now survive longer, which explains the increase in the number of people living with AIDS despite the decline in the number of new infections.

There are major disparities in the spread of the epidemic from one region to another and within the same country or region. The significant differences between sub-Saharan Africa and other regions of the world are well-known. Sub-Saharan Africa remains the worst affected region, with 70 % of new infections in 2010 and 67 % of AIDS-related deaths (Table 6.5). The African HIV epidemic is highly heterogeneous, with some countries affected very early on and where the prevalence of the disease remains relatively low (such as the Democratic Republic of the Congo and the Republic of the Congo), countries where the epidemic spread rapidly (Rwanda, Uganda), and countries where the epidemic started later (in the 1990s) but reached the highest prevalence, such as Southern African countries.

Southern Africa is the worst affected region, with 35 % of the population infected with the disease, despite accounting for just 0.8 % of the world population. A quarter of the population aged 15–49 is infected with HIV in Swaziland, Botswana, and Lesotho, while 15–20 % of the population is infected in Malawi, Mozambique, Zambia, Zimbabwe, and South Africa. Uprooting, households split between town and country, male celibacy, single women in urban areas, one woman in an urban area and another in a rural area, rapid urbanization in these mining and industrial regions of Africa, and immigration have undermined the support structures providing protection, particularly from STDs (Vaillant and Salem 2008). In East Africa, the prevalence of HIV is currently less than half the current rate in Southern Africa (between 5 and 10 % in Kenya, Tanzania and Uganda). The prevalence of the disease in West Africa (4 % in Côte d'Ivoire) is roughly a fifth of the prevalence rate in Southern Africa. This state of affairs is related to a number of socioeconomic, cultural, behavioral and biological factors, such as migrations and male circumcision.

In most Asian countries, the epidemic has mainly affected drug users and sex workers. In Cambodia, Myanmar, and Thailand and in ten states of India, the prevalence of the disease among adults is estimated to be 1–1.5 %. AIDS epidemic trends in the most populated countries in the world (China and India) will have a determining influence on the global pandemic, although the prevalence of the disease remains low in these countries (0.1–0.2 %). In the WHO Eastern Mediterranean Region, it is estimated that nearly 800,000 people live with AIDS. The Caribbean is the worst affected region of the American continent, with a prevalence rate among adults above 1 % – the highest prevalence rate in the world outside sub-Saharan Africa. In Latin America, the WHO estimates that nearly 1.5 million people are infected.

Table 6.5 Regional HIV and AIDS statistics, 2001 and 2010

Regions	Adults and children living with HIV (millions)	Adults and children newly infected (millions)	AIDS-related deaths (millions)	% Adult prevalence (15–49 years)
Sub-Saharan Africa				
2010	22.9	1.9	1.2	5.0
2001	20.5	2.2	1.4	5.9
South and South-East Asia				
2010	4.0	0.270	0.250	0.3
2001	3.8	0.380	0.230	0.3
Latin America				
2010	1.5	0.100	0.083	0.4
2001	1.3	0.099	0.067	0.4
East Asia				
2010	0.790	0.088	0.056	0.1
2001	0.380	0.074	0.024	<0.1
Middle-East and North Africa				
2010	0.470	0.059	0.035	0.2
2001	0.320	0.043	0.022	0.2
Caribbean				
2010	0.200	0.012	0.009	0.9
2001	0.210	0.019	0.018	1.0
Eastern Europe and Central Asia				
2010	1.5	0.160	0.090	0.9
2001	0.410	0.210	0.008	0.3
North America				
2010	1.3	0.058	0.020	0.6
2001	0.980	0.049	0.019	0.5
Western and Central Europe				
2010	0.840	0.030	0.010	0.2
2001	0.630	0.030	0.010	0.2
Océania				
2010	0.054	0.003	0.0016	0.3
2001	0.041	0.004	0.0018	0.2
World				
2010	34.0	2.7	1.8	0.8
2001	28.6	3.1	1.9	0.8

Source: WHO-UNAIDS (2011): 49

Heterosexual relations are the main transmission route, accounting for almost 55 % of reported cases, although intravenous drug use is a key factor and could become the main vector of the disease (WHO 2005).

Alongside the aggravation of the epidemic, an increasing number of married women are becoming infected, as well as many girls and young women. Women represent almost half of all people living with HIV across the world and almost 60 % of infected people in sub-Saharan Africa (Fig. 6.4). Women are at greater risk of contracting HIV

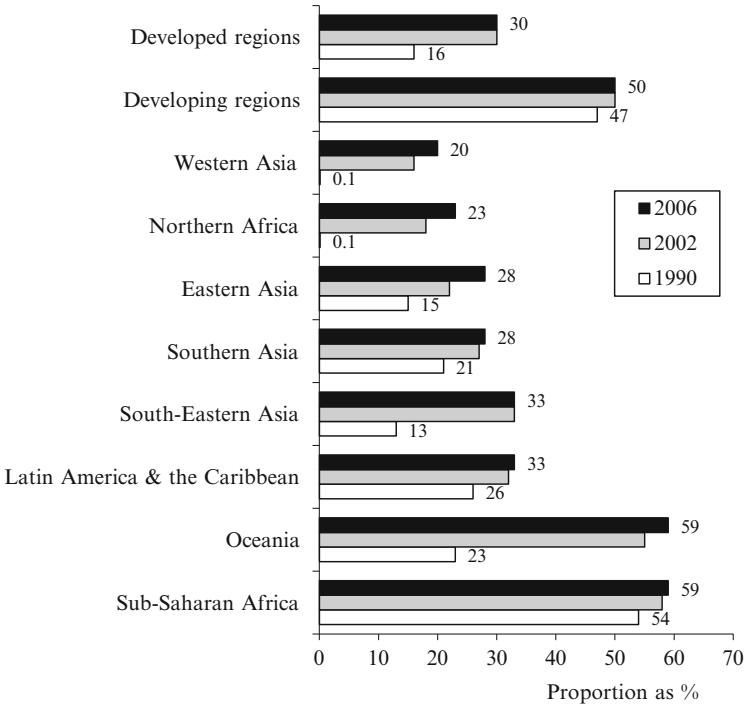

Fig. 6.4 Proportion (%) of women living with HIV, in the population aged 15 years an older, by region, 1990, 2002 and 2006 (Source: United Nations 2007)

for physiological reasons and because they lack authority in sexual matters, often finding themselves in a position of inferiority and being forced to accept sexual relations with little prospect of protected sex. The unequal power relations between men and women have thus contributed to the feminization of the epidemic. The tradition of child marriage can also put girls at risk. In its 2010 Millennium Development Goals Report, the United Nations reported that a survey conducted in eight countries showed that young women (aged 15–24) who had their first sexual experience before the age of 15 were more likely to be HIV-positive. The tacit social acceptance of violence toward women has only served to aggravate the problem. In the 15–24 age group, the ratio of women to men in the infected population can be as high as three women for every one man. Youth is also a risk factor for both sexes, since 40 % of new infections among people aged 15 or over are among 15–24 year olds.

6.2.2 The Consequences of AIDS

The impact of AIDS is considerable. While the effects on mortality are significant and widely documented, the human, social and economic implications are also significant.

The Increase in Mortality

In many countries, and in particular those worst affected by HIV/AIDS, the declining trend in infant and child mortality rates came to an end in the 2000s, highlighting the negative impact of the epidemic. According to the WHO, AIDS accounts for approximately 8 % of all deaths among children under 5 in sub-Saharan Africa and between 20 and 60 % in Southern African countries. However, in the absence of reliable data on the causes of death in these countries, our understanding of the impact of HIV infection on child mortality remains limited. The latest WHO estimates (2010b) indicate that 2.1 million children aged under 15 live with HIV throughout the world, including 1.8 million in sub-Saharan Africa (86 %). Over 90 % of these children were infected in utero, at birth or by breastfeeding. The number of infected children can be reduced by providing antiretroviral therapy to pregnant women.

The most well-known effects have been on adult mortality. In the worst affected countries of East and Southern Africa, the probability of a child aged 15 dying before the age of 60 has increased sharply, from 10–30 % in the mid 1980s to 30–60 % in the mid 2000s. Studies conducted in East Africa have shown that among HIV-infected adults, mortality rates have been 10–20 times higher than among non-infected adults, with the greatest differences found between 20 and 40 (WHO 2005). Women tend to die younger than men, with infection rates generally peaking 5–10 years earlier than among men. Census data and data from national surveys have shown a constant increase in adult mortality rates. In Kenya, the probability of dying between the ages of 15 and 60 rose from 18 % in the early 1990s to 48 % in the 2000s. In Malawi, it has risen to 63 %, compared to 30 % in the early 1980s. In Zimbabwe, the probability of dying between the ages of 15 and 60 was 50 % for women and 65 % for men, but has risen to 80 % for both sexes. In Thailand, the available data show that mortality has risen despite a much lower prevalence of the disease than in the majority of African countries.

The disease has spread so rapidly and on such a large scale that many African countries have seen no increase in life expectancy. Across sub-Saharan Africa and East Asia, life expectancy remained unchanged between 1985 and 2005 (Fig. 6.5). Despite having the highest life expectancy at birth of all African regions at the end of the 1980s (>61 years), Southern Africa has seen a decline in life expectancy at birth of 10 years in the space of a decade. The worst affected countries lost up to 15 years of life expectancy between 1985–1990 and 2005, such as Botswana and Swaziland, and up to 20 years in Zimbabwe.

In all African countries, current life expectancy at birth is several years below what it was before the rise of HIV. The impact has been particularly significant in Southern Africa (Fig. 6.6), with up to 20 years of lost life expectancy at birth.

The WHO estimates that the worst is yet to come. The poor regions of Asia, and in particular the densely populated areas of Southeast Asia, are the latest to be affected by AIDS, and over the last two decades, the number of cases has increased at an alarming rate. The morbidity and mortality burden will reach considerable levels if the current trend continues. Although an increasing number of infected people are receiving treatment, the number of infected people is currently on the

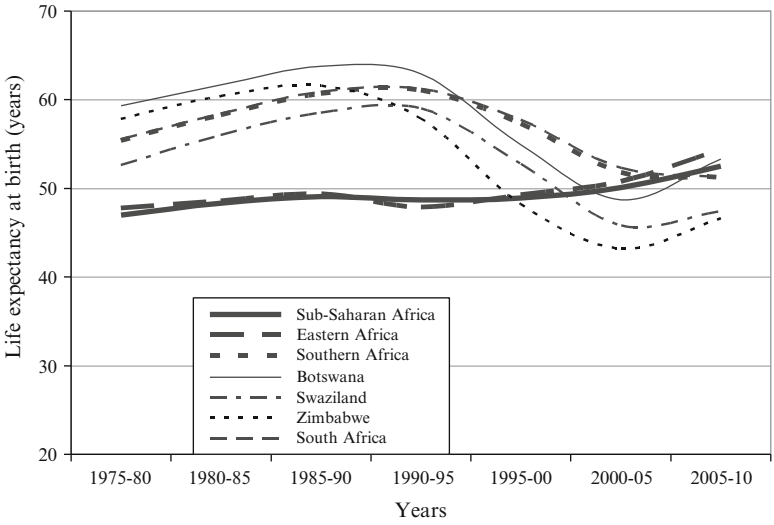

Fig. 6.5 Life expectancy at birth in some African regions (Source: United Nations, World Population Prospects, the 2010 Revision)

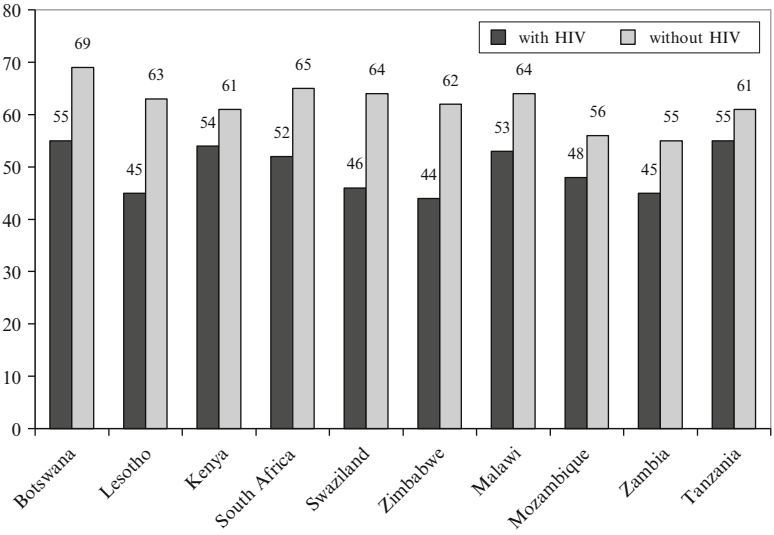

Fig. 6.6 Life expectancy at birth (years) with VIH or not in ten countries, 2010 (Source: United Nations 2010)

increase. Thus, even if the incidence and prevalence of the disease decline in the years ahead, AIDS-related mortality will continue to increase. According to UN projections, life expectancy in South Africa could drop by 10 years by 2020–2025 and by almost 6 years in Lesotho. The WHO predicts that in the next 20 years,

AIDS-related deaths could result in an increase by half of infant mortality in some countries.

The impact on mortality has increased as a result of the links between AIDS and other infectious diseases. Malaria, bacterial infections, and tuberculosis are the leading causes of AIDS-related morbidity in sub-Saharan Africa. HIV increases the incidence and severity of the clinical symptoms of malaria among adults. HIV and malaria have become the two most significant public health issues in a number of African countries. The pandemic has also resulted in significant changes in the epidemiology of tuberculosis. In Africa, a third of the population is infected with the tuberculosis bacillus, although they are not necessarily ill. Roughly 20 million people in Africa and 5 million people in Southeast Asia are infected with both HIV and the tuberculosis bacillus. A significant proportion of these people risk developing active TB if they have no access to treatment since HIV significantly increases the probability of falling ill among carriers of the TB bacillus (see the passage on tuberculosis above).

The Human, Social and Economic Impact

The epidemiology of HIV reveals only one aspect of the problem. In the social fabric of the worst affected populations, AIDS has a much greater impact than the mere suffering caused by the disease. Thousands of children are orphaned, entire communities are wiped out, the health services are overworked and entire countries are faced with famine and economic collapse.

AIDS changes the structure of the population. In many African countries, the proportion of dependents has increased, with a declining number of working-age adults capable of providing for children and the elderly. In 2008, there were approximately 17.5 million children under 18 who had lost one or both parents to AIDS, including 80 % (14 million) in sub-Saharan Africa alone (WHO 2010b). In the worst affected countries, 15–25 % of children are orphans. AIDS orphans are more likely to be affected by poor health, inadequate education and lack of protection than children who lost their parents for other reasons. They are also more likely to be malnourished, ill or exposed to child labor, mistreatment and abandonment or sexual exploitation – practices that increase their vulnerability to the epidemic. They also suffer from social stigmatization and discrimination and are often refused access to basic services such as education. Current projections estimate that the number of orphans will continue to rise, even in countries where the prevalence of the disease has remained stable, as infected parents die of the disease. Until now, several countries have been able to provide for orphans, although not all countries will be able to respond to the explosion of the phenomenon. When their numbers are limited, orphans can be taken in hand by the extended family. However, there are now so many orphans that many of them end up living on the street.

For young people who see their elders disappearing en masse and so rapidly, the psychological impact is devastating, and questions about their future are a major concern. In addition, parents who die prematurely are unable to transmit possessions

and capital to their children. In this sense, HIV/AIDS undermines the accumulation and transmission of human capital – experience, skills and knowledge – from one generation to another (WHO 2004).

The effects of the epidemic on the demographic structure of the population and life expectancy can cause significant changes in socio-economic behavior. Families facing a loss of income and increased health expenditures will typically resort to solutions than can have a negative long-term impact, such as emigration, child labor, the sale of belongings and the liquidation of savings. In addition to medical and funeral costs, families also face indirect costs generated by the effect of the disease on productivity. The poorest populations are the worst affected since they are both more vulnerable to infection and will find it increasingly difficult to cope with the economic consequences of the epidemic. Disease causes poor families to sink further into poverty.

The combined effects of the epidemic could have disastrous consequences on long-term economic growth and may seriously compromise efforts to reduce poverty in many developing countries. Until recently, most experts agreed that a generalized epidemic with a prevalence of 10 % in the adult population would reduce economic growth by approximately 0.5 % per year. More recent studies and estimates from the World Bank have painted a much darker picture of current and future economic impacts. The WHO indicates that 'HIV/AIDS will have long-term and widespread effects that will last for generations, and which do not reveal themselves in many economic studies. Ill-health and premature death lead to wasted investment in human capital and globally reduce the incentives to invest in building for the future. An inadequate response to HIV/AIDS will allow the disease to continue to destroy education systems and other vital institutions, reduce human capital and the ability to transmit it, and contribute to a long-term decline in savings and investment. There will therefore be substantial benefits in responding to epidemics – even those of low prevalence' (WHO 2004: 10).

Given the human and socio-economic impact of the spread of HIV, the need for effective large-scale preventive measures is as urgent today as it was in the early days of the epidemic. The epidemic could be eradicated through effective prevention and improvements in access to care and treatment.

6.2.3 Prevention and Access to Care for AIDS Patients

Today, there are a number of tools for fighting against the spread of AIDS. However, the first strategy to avoid contamination is to understand how to prevent the transmission of the disease. This is particularly important among 15–24 year olds, who account for 40 % of newly infected adults. The level of understanding of HIV and of the means of preventing it remains inadequate among young people in most countries. On average, less than a third of young people and less than a fifth of young women in developing countries state that they have an adequate understanding of HIV. The lowest levels (9 %) are found among young women in North Africa.

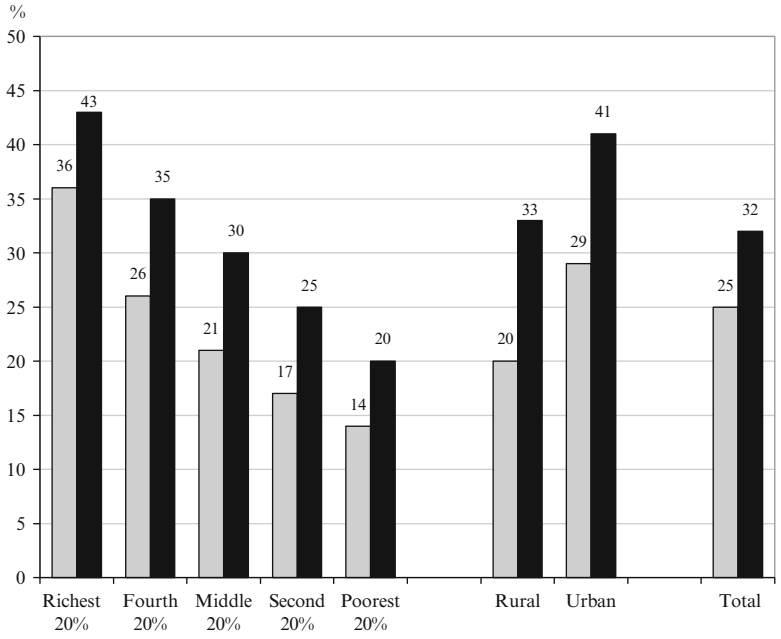

Fig. 6.7 Disparities in knowledge about HIV prevention among population aged 15–24 years, in Sub-Saharan Africa (%) (Source: United Nations 2010)

The level of understanding of the disease is well below the 95 % rate defined by the Extraordinary Session of the General Assembly of the United Nations on HIV/AIDS in 2001.

However, despite low regional averages, some countries have achieved significant progress in HIV youth education. In 18 of the 48 countries with trend data, the proportion of women aged 15–24 with a good understanding of the disease increased by 10 % or more between 2000 and 2008. Similar results were found among young people in 8 out of 16 countries. Among these countries, Cambodia, Guyana, Namibia, Rwanda and Trinidad-and-Tobago now have 50 % of young women with a good knowledge of HIV. Rwanda and Namibia have reported similar progress among young people.

The variations in sub-Saharan Africa in terms of the understanding of the disease among 15–24-year-olds are linked to gender, the economic status of households and area of residence (Fig. 6.7). Among both men and women, information on HIV increases in line with the level of household income. The gap between the sexes is significant among the poorest sections of society and in rural areas, but is narrower among the wealthiest sections of society and in urban areas.

The education sector has a key part to play in the prevention of the epidemic. Providing primary and secondary school children and teenagers with specific information on the gender dimension of the disease and the prevention of HIV is essential to ensure that they are able to put prevention measures into practice.

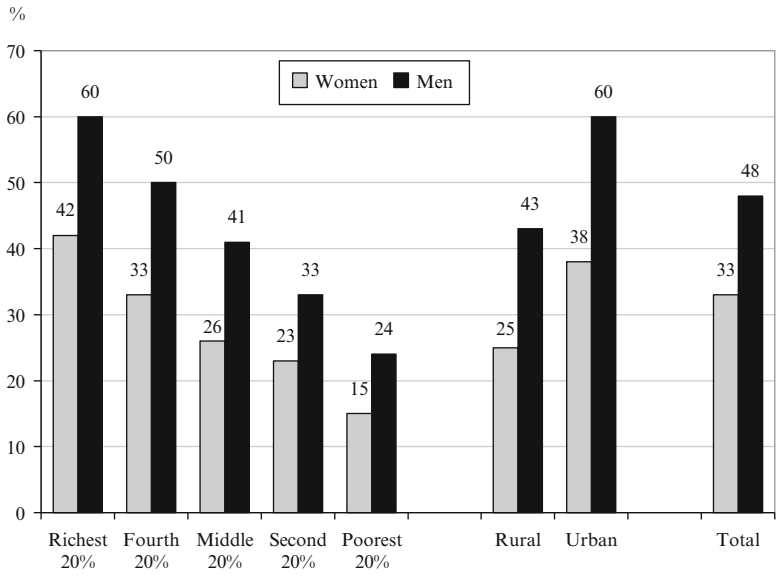

Fig. 6.8 Disparities in condom use by young people aged 15–24 years in Sub-Saharan Africa, 2003–2008 (%) (Source: United Nations 2010)

Comprehensive sex education in schools has been shown to be an effective way of changing attitudes and practices leading to risk behaviors. Young women are more vulnerable when they lack the knowledge and skills required to protect themselves and have only limited access to sexual and reproductive health services. Norms, practices, beliefs and social and cultural laws can also increase the relative impotence of young women and their susceptibility to HIV infection. The link between sexist violence and the spread of HIV underlines the importance of raising awareness of HIV among adolescents through comprehensive prevention programs. Social changes are required to promote zero tolerance of violence against women and girls. Solutions also include adopting and enforcing laws defining violence against women and girls as a criminal offence.

Condoms are a simple prevention method. In most developing countries, the majority of young people do not use condoms during sexual intercourse, even if they are at risk of contracting HIV. Studies indicate that on average, less than 50 % of young people and a third of young women used a condom in their last high-risk sexual encounter. Differences according to sex, area of residence and income have been found in sub-Saharan Africa in all countries for which data are available (Fig. 6.8).

However, there is evidence to suggest that adequate policies and interventions can have positive results. Between 2000 and 2008, the rate of contraceptive use among young women rose from 48 to 64 % in Namibia, from 29 to 44 % in Mozambique, and from 25 to 40 % in Kenya. This progress is due in large part to individual initiatives, supported by a range of behavioral, biomedical and structural

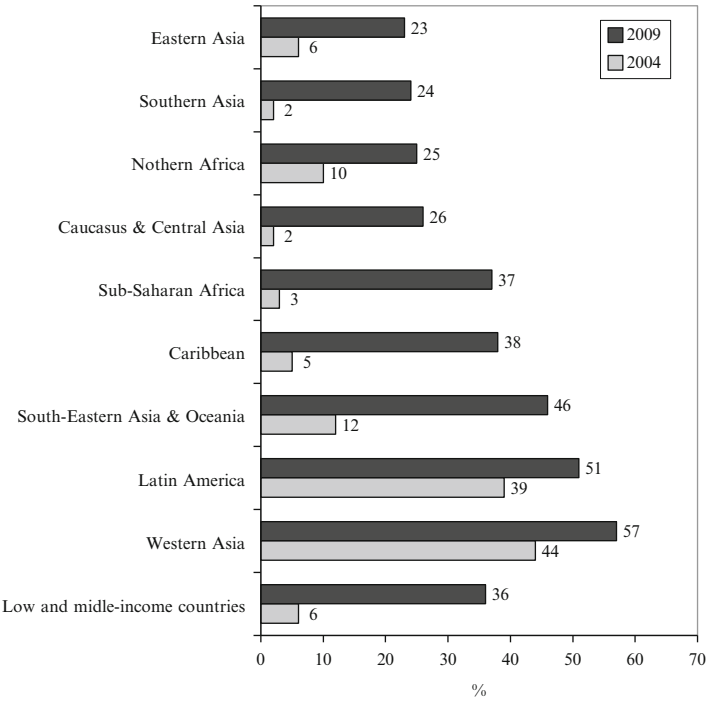

Fig. 6.9 Proportion of population living with HIV who are receiving antiretroviral treatment, 2004 and 2009 (%) (Source: United Nations 2011b)

interventions and the collective efforts of national governments, development partners and civil society.

For the populations of developing countries, antiretroviral therapies are expensive and national health systems are still struggling to ensure universal access to treatment. In late 2009, roughly five million patients received antiretroviral therapy, including nearly three million in sub-Saharan Africa. There are still significant disparities between regions, with East and South Asia the worst affected regions (Fig. 6.9).

In 2003, the '3 by 5' initiative was launched to provide antiretroviral treatment to three million people living in low-income countries by 2005, compared to 400,000 in 2003. Progress was made until December 2009, with five million patients receiving treatment, including one million the previous year. The most significant progress was made in sub-Saharan Africa, where two thirds of those requiring treatment currently live.

However, for every two people who start the treatment every year, there are five new cases of HIV infection. New infection rates have continued to increase more rapidly than the availability of treatment. There is an urgent need to step up the measures aimed at increasing access to prevention and treatment. In 2009, of the 15 million people requiring treatment and living in developing countries, over 60 % had no access to drugs (i.e. almost ten million people).

The number of people needing treatment is likely to increase in the years to come. The WHO has revised its guidelines in the face of new scientific evidence. The available data for 90 developing countries indicate that adult women are less affected than men, since approximately 39 % of women and 31 % of men (and 28 % of children) requiring treatment received antiretroviral therapy in 2009.

In-utero infection can be reduced by providing antiretroviral treatment to pregnant women. Over the last decade, the international community has committed to providing health services on a larger scale and to reducing the burden of HIV among women and children. In 2008, 45 % of HIV-positive pregnant women received treatment – an increase of 10 % compared to the previous year. Infection prevention programs targeting newborns have been introduced in most of the worst affected countries. However, transmission by breastfeeding remains a major issue. While the promotion of breastfeeding was one of the cornerstones of the fight against infant mortality, it is difficult to advise HIV-infected women to bottle-feed their baby, particularly in poor hygiene conditions.

6.3 The Rise of Non-communicable Diseases and Injuries

The global burden of non-communicable diseases is currently on the increase and accounts for almost a third of the global burden of disease. While the proportion of the burden of disease due to non-communicable diseases is 80 % among adults in developed countries, it is already above 70 % in middle-income developing countries and has almost reached 50 % in WHO regions with high mortality rates. In many developing countries, the spread of the epidemic of non-communicable diseases is due to population ageing and changing lifestyles. In developing countries, the adoption of 'modern' lifestyles and habits has resulted in the rise of new lifestyle risks as countries move through the demographic and health transitions.

The WHO estimates that in 2004, non-communicable and injuries accounted for 33 million deaths in developing countries and that they will represent an increasing proportion of total mortality in the future. In the long term, the health of individuals also deteriorates as a result of chronic diseases, sensory and mental disorders and violence.

6.3.1 Non-communicable Diseases

Non-communicable diseases were long thought to be diseases of developed countries (i.e. western diseases) caused by lifestyles that differed widely from those prevailing in most of Africa, Asia, and many other developing regions.

Cardiovascular diseases are the leading cause of mortality in the world and account for 30 % of deaths, i.e. nearly 18 million deaths per year. There is still a widespread assumption that cardiovascular diseases mainly affect affluent populations and are

due to natural ageing and degenerative processes. Cardiovascular diseases are still widely seen as lifestyle-related diseases that depend entirely on the will of individuals. In developing countries, cardiovascular disease mortality accounts for 20 % of total mortality and the prevalence of coronary and vascular diseases is close to the prevalence of infectious and nutritional diseases. Of the eight million people who die of coronary disease every year, 80 % of deaths occur in developing regions overwhelmed by the phenomenon.

There are twice as many deaths by cardiovascular disease in developing countries as in developed countries. Cardiovascular diseases are the third leading burden of disease (behind injuries and neuropsychiatric disorders). Heart disorders and cerebrovascular accidents, the leading causes of death in developed countries, have also become the leading causes of death in developing countries, accounting for a third of all deaths.

The relatively young age at which people in developing countries die of these diseases compared to those in developed regions is a major concern. In India, 50 % of cardiovascular disease deaths occur before the age of 70, compared to 20 % in countries with a developed economy. In Tanzania, the mortality rates due to cerebrovascular accidents are three times higher than in England and Wales.

The causes of the epidemic of cardiovascular disease are well known (WHO 2003). The main risk factors are hypertension (nearly half of cardiovascular disease cases) and hypercholesterolemia (nearly a third). The globalization of trade and the development of marketing have continued to change eating habits, with diets high in saturated fats, sugar and salt becoming increasingly common. In addition, the contribution of protective components such as fiber and phytochemical components found in fruit and vegetable has gradually declined. Combined with smoking and lack of exercise, a diet of this kind causes atherosclerosis and accounts for the frequency and distribution of cardiovascular disease. Variations in the main common risk factors largely account for the differences in the prevalence rate of cardiovascular disease between countries. The three main risk factors account for 75–85 % of new cases of coronary cardiopathy. The majority of the population in most countries is at risk of cardiovascular disease, since the main risk factors are above the optimum levels. There are only a very small number of poor countries where these factors have not become major public health concerns.

The example of developed countries, where these diseases have declined, shows that the spread of these diseases in developing countries can be curbed by appropriate prevention and treatment. However, the conditions in which these diseases thrive differ. Developing countries affected by rapid lifestyle changes related to urbanization in less than 50 years (compared to over two centuries in developed countries) and marked by poverty have yet to develop a prevention policy, while access to treatment (even the least expensive forms of treatment) remains limited. Therefore, current projections estimate that over 80 % of the increase in cardiovascular disease mortality will be borne by developing countries and by the poorest populations in these countries. In 2025, almost three quarters of the hypertensive population worldwide will live in developing countries. Thirty percent of the adult population in sub-Saharan Africa is already affected by hypertension.

Cancer is another significant factor of morbidity in developing countries. In 2005, the WHO reported 7.6 million cancer deaths in the world, accounting for 13 % of deaths, and nearly 25 million people living with cancer. Over 70 % of these deaths occur in developing countries, although mortality rates (all types of cancer) are higher in developed countries. The increase in the number of cancer cases is related to population ageing and population growth. Cancer mortality is lower in developing countries, where tumors account for 10 % of deaths, compared to over 20 % in developed countries. People in developing countries are as exposed as others to the risk of cancer. However, because of their shorter life expectancy and the latency period of many forms of cancer, people in developing countries often die of another condition before developing cancer. Although developing countries appear to be at an advantage, there are significant inequalities in access to screening and treatment between different regions of the world: 80 % of cervical cancer deaths occur in developing countries, although this particular type of cancer is not fatal if detected and treated early.

The most well-known risk factors of cancer are smoking and alcohol and excessive consumption of certain foods such as animal fats (while other types of food are known to protect against cancer, such as fruit, vegetables, and fiber). The most common forms of cancer in developing countries are associated with viruses – liver cancer and hepatitis B, cervical cancer and the human papillomavirus, Burkitt's lymphoma and nasopharyngeal carcinoma and the Epstein-Barr virus. Stomach cancer and cervical cancer are also associated with a low socioeconomic level, while intestinal cancer, breast cancer and prostate cancer are considered to be diseases of affluence.

Diabetes mellitus, long associated with affluence and the Western diet, is becoming a major public health problem in developing countries, where diabetes mortality is on the increase and occurs at an early age, while it is declining in developed countries. The most likely factors include changes in diet associated with urbanization and industrialization and the lack of health care services capable of detecting diabetes and avoiding complications.

Among the harmful practices associated with modernization, smoking is already a major cause of mortality and morbidity in the developing world. Whether directly or indirectly through passive smoking, smoking causes five million deaths every year, including nearly 50 % in developing countries and half before the age of 70. Besides the various forms of smoking-related cancer, smoking can cause chronic diseases of the lower respiratory tract, with chronic bronchitis the most common disease. Chronic bronchitis is a serious and potentially fatal condition in the event of complications in the form of bronchial obstruction and respiratory failure.

Whereas there has been a decline in smoking in many developed countries, smoking is becoming increasingly common in developing countries. According to the latest WHO estimates, the prevalence of smoking among adult men in 2006 was 18 % in the Africa region, a third in the Eastern Mediterranean, and 40 % in Southeast Asia, with some countries reaching almost 50 % of smokers in the male population, and even more in some cases. Smoking is less prevalent among women in developing countries. Current estimates suggest that smoking

will become increasingly prevalent in these countries in the years to come. The prevalence of smoking among young people aged 13–15 is above 20 % in developing regions and between 15 and 20 % in the female population of the same age group (WHO/CDC 2010). The WHO estimates that if the global prevalence of smoking remains unchanged, half of the 1.7 billion smokers in 2025 will die from a smoking-related disease.

Despite the adoption of the WHO Framework Convention on Tobacco Control in 2003 by the World Health Assembly, very few countries have taken all the necessary measures to significantly reduce tobacco use. Most countries lack the necessary infrastructures and resources to maintain a minimum anti-smoking program. In addition, many developing countries have yet to mobilize public opinion. The treatment of tobacco addiction is another measure to be considered in low-income countries. Smoking cessation programs aimed at adults are necessary to improve population health over the next 20 or 30 years since the effects of prevention measures aimed at young people will only begin to be felt in several decades. There are many obstacles preventing most countries from providing treatment for tobacco dependence. Health systems could provide assistance to the most disadvantaged populations, who are more prone to smoking, by providing support and ensuring access to treatment. The success of the fight against smoking requires continued political will and the provision of additional resources at a global and national level (WHO 2003).

6.3.2 Injuries

Injuries of all kinds, whether intentional or unintentional (accidental), often leading to serious disabilities, account for a significant proportion of the burden of disease in developing countries (13 % of DALYs). Road traffic accidents are the leading cause of injury-related morbidity. Over 20 million people are killed or seriously injured every year on the roads. The toll is particularly heavy in developing countries, particularly sub-Saharan Africa and Southeast Asia, where the road accident epidemic has only just begun. Mortality and disability caused by road traffic accidents are expected to rise in many developing countries (as a result of the increasing number of vehicles), particularly if road networks remain inadequate and road safety measures are not imposed.

The situation is such that by 2020, road accidents are expected to become the third leading cause of DALYs in the world. The WHO estimates that the number of road deaths will increase by 92 % in China, 147 % in India and 80 % on average in many other developing countries. Road accidents are to a large extent preventable. There are many affordable interventions to prevent accidents and save lives. However, the effectiveness of these measures has mainly been studied in developed countries. Further studies are needed in developing countries. We know that in developing countries, there are significantly more fatal accidents than in developed countries, with mortality rates sometimes 200 times higher.

In the poorest countries, universal access to safety will require international assistance to develop infrastructures and human resources. Governments can be encouraged to consider road safety and accident prevention as an important way of promoting economic, social and environmental development and of mobilizing the necessary resources to curb an epidemic that will worsen if nothing is done. In addition to injuries and deaths, the increasing number of vehicles will have other serious health consequences. In some countries, traffic-related air pollution causes more deaths than traffic accidents. Compared to the major communicable and non-communicable diseases, this cause of morbidity continues to be overlooked.

Intentional injuries represent an increasing proportion of the burden of disease, particularly among economically productive young adults. In developing countries, wars and acts of violence account for most intentional injuries, while suicide and suicide attempts are the leading causes in developed countries.

The long-term effects of disease and injuries are a major cause of disability in populations. Visual and hearing impairments and HIV/AIDS infection cause the greatest number of years lived with a disability in developing regions with high mortality rates. In developing countries with low mortality rates, the majority of disabilities among adults are caused by obstructive pneumopathy and other non-communicable diseases, particularly cerebrovascular accidents, in addition to visual and hearing impairments.

Paradoxically, over 80 % of years lived with a disability throughout the world occur in developing countries, including over half in developing countries with high mortality rates. The number of years lived with disability is higher in developing countries (nearly 200 per 100,000 people, compared to 130 in developed countries) and is indicative of the higher incidence of disabling conditions, which are also more serious. People in developing countries are more likely to die young than people in developed countries, and are also more likely to have a disability.

6.4 Conclusion: The Double Burden of Disease

Although the health situation in the developing world has improved in recent decades, there are still serious health issues (particularly in sub-Saharan Africa) and significant health inequalities between countries.

Developing countries have a long way to go to eradicate the old infectious and parasitic diseases, which account for up to 40 % of the total burden of disease in these countries. Population growth (rapid in most developing countries) has had a significant impact on the emergence or resurgence of infectious and parasitic diseases such as cholera, malaria, yellow fever, dengue fever, and diphtheria and infections caused by antibiotic-resistant bacteria, despite the efforts made to stop the spread of epidemics. Among these conditions, malaria and tuberculosis play a major part, in addition to HIV/AIDS, which has made the demographic transition more complex and difficult to read in recent years. HIV/AIDS remains a major health emergency. The number of people infected with HIV and dying of AIDS has continued

to increase at such a rate that treatment services have been unable to keep up with the growing demand for care. In many countries, the AIDS epidemic has created a state of economic emergency that has undermined development. Curbing AIDS will require access to cheap preventive and curative medicine and increased efforts to promote safe sex.

While these old infectious and parasitic diseases continue to have an impact, the epidemic of non-communicable diseases has already spread to many developing countries. 'Diseases of affluence' (cardiovascular diseases, digestive diseases, cancer) are no longer the preserve of wealth and development, since they are becoming significant causes of morbidity and mortality in the poorest countries in the world, where alcohol and tobacco use is rapidly increasing. This trend is expected to worsen in the years ahead and is largely related to changes in lifestyle, and in particular urbanization, which has contributed to transforming eating habits, activities, and social structures. Compared to developed countries, these changes have occurred at a much faster pace in developing countries. Cardiovascular diseases are becoming increasingly common in most of the poorest countries in the world and their burden is expected to increase in the years to come, if only as a result of population ageing. In poor and transition countries, the suddenness of the changes means that overweight and obesity now coexist with malnutrition, sometimes within the same social environment and, in some cases, within the same family. Road accident deaths and injuries are expected to play an increasingly important part in many developing countries.

The spread of these chronic diseases in the poorest countries, where they are becoming increasingly prevalent, is a sign of the epidemiological transition known as the 'double burden', whereby non-communicable diseases have added to the burden of communicable diseases, which continue to be prevalent. In addition, disabilities are becoming more common in developing regions, contrary to common belief. In developing countries, the main challenge for public health policy-makers is to tackle the spread of epidemics of non-communicable diseases while communicable disease epidemics remain prevalent. The challenge is compounded by the fact that health systems remain desperately underfunded and inadequate, particularly since the double burden (which is becoming increasingly heavy) risks undermining the socio-economic development of these countries.

The most effective way of fighting against all of these diseases (i.e. communicable and non non-communicable diseases) is prevention (primary and secondary), whether in the medical sphere (e.g. vaccines) or in terms of behaviors and lifestyles, such as eating a balanced diet and limiting alcohol and tobacco use. According to Myriam Khlat and Sophie Le Cœur, 'the epidemiological identification of lifestyle habits that put people at risk of a condition provides public health authorities with a potentially very powerful tool for disease control. Ultimately, the greater the diffusion of medical and health technology throughout the world, the greater the onus on individuals to take responsibility for the improvement of their own health' (2002: 523). To enable individuals to do this, the best investment in health care is to develop policies promoting healthy lifestyles aimed at encouraging a balanced diet and regular exercise, limiting tobacco and alcohol consumption, promoting contraception and reducing illegal drug use.

In developing countries, the data required to calculate the different morbidity indicators are sometimes lacking. Data on healthcare supply and demand can also be used when available. In terms of healthcare supply, current indicators focus on health infrastructures or are based on microeconomics. Measurements focus in particular on the number of doctors, paramedics, dentists, and chemists per 1,000 population, hospital services (number of hospitals, number of beds), preventive care services (clinics, maternal and child protection services, screening centers, etc.), or the provision of home care services. Healthcare supply can also be measured based on the share of GDP allocated to health or the proportion of the population covered by health insurance. The indicators of healthcare demand focus on the use of health services – i.e. number of consultations, number of hospital admissions and interventions, bed occupancy rates, consumption of drugs, proportion of vaccinated children, proportion of malnourished children and type of malnutrition.

Several factors determine healthcare supply and demand. The health funding system has an impact on supply (private institutions) and demand. An extension of coverage generally increases the use of health services. The demographic situation, particularly medical demographics, has an impact on healthcare supply and demand, with doctors tending to be concentrated in urban areas. The level of socioeconomic development determines the quantity and structure of supply, while demand varies according to age, sex and social and occupational category. In addition, healthcare supply and demand are not independent of each another; in other words, the greater the supply, the greater the demand. Therefore, morbidity indicators of this kind need to be used with caution, particularly in comparing countries with different health systems.

Chapter 7
Health Systems in Developing Countries

In developing countries, meeting the challenge of health for all presupposes the existence of a high-quality universal health system. The WHO defines a health system as 'all the people and actions whose primary purpose is to improve health' (WHO 2000: 1). Although health systems have contributed significantly to improving the health of populations, the full realization of their potential remains limited by significant disparities. The WHO has made repeated calls for an improvement of primary health care along the lines of the principles outlined at the Alma-Ata conference in 1978. While they remain valid, these principles need to be redefined in line with the changes that have occurred in the area of health since their initial introduction. In seeking to learn from past experiences, the WHO has called for a range of reforms reflecting 'a convergence between the values of primary health care, the expectations of citizens and the common health performance challenges that cut across all contexts' (WHO 2008).[1] The WHO has repeatedly emphasized the importance of fair and universal primary health care.[2] After re-examining the shift toward primary health care, this chapter will focus on the difficulties facing current health care systems and accounting for their inefficiency. In order to revitalize health care systems and to align them with the needs of populations in a rapidly changing world, the WHO has called for a number of reforms. These reforms will also be examined in detail.

[1] Message of Dr Margaret Chan, Director-General, World Health Organization.

[2] Health systems have been the focus of several annual reports by the WHO. This chapter is largely based on these reports, and in particular those published in 2000 2003, 2006, 2008 and 2010a.

M. Gaimard, *Population and Health in Developing Countries*, Demographic Transformation and Socio-Economic Development 2, DOI 10.1007/978-94-007-6793-5_7,

7.1 Toward Primary Health Care[3]

7.1.1 The Birth of Health Systems

Health systems have always (or almost always) existed, ever since human beings developed a concern for their health and the treatment of illnesses and diseases. For thousands of years, traditional practices using plant-based remedies developed alongside modern medicine, often in combination with spiritual practices and beliefs. Some of these practices are still widely used in the absence of more modern, accessible, low-cost or trusted methods. For example, traditional Chinese medicine, dating back several thousand years, still plays a key role in the Chinese health system. The same applies to ancient medicines, practices and beliefs among populations in Asia, Africa and America. However, up until the nineteenth century, there was no organized health system aimed at the population as a whole, even in industrialized countries. Hospitals, even where they existed, were not accessible to the poorest members of society.

In industrialized countries, modern health systems gradually developed from the late nineteenth century onward, when societies became increasingly aware of the heavy toll paid by workers in the form of deaths, illnesses and disabilities. The consequences were not merely in terms of human lives, but were also apparent in the form of productivity losses. Employers began to provide basic health services to their employees and sought to improve the living conditions of workers by providing access to drinking water and promoting improved sanitation. Health systems began to develop throughout Europe, as did health benefits for certain employees. The earliest example of a social protection model imposed by the state was in Germany, where an act passed in 1883 required employers to contribute to the health insurance of certain low-income workers.

The influence of the German model began to spread beyond Europe after World War I. In 1924, the Chilean Ministry of Labor provided medical coverage for all insured workers. Costa Rica developed the foundations of a universal health insurance system in 1941. In 1943, Mexico created the Institute for Social Security and the Ministry of Health. In 1944, South Africa outlined plans for a national health system including free health care and a network of community centers and general practitioners. However, the plans were never implemented.

'As former colonies gained independence, they also tried to adopt modern, comprehensive systems with heavy state participation. The factors which made this period of system building and expansion possible included realization of the power of the modern state, post-war movements towards reconciliation, stability and reconstruction, and collective solidarity stemming from the war effort. Newly acquired citizenship and the belief in a relatively effective and benevolent state which could promote development of all kinds led to a social and political environment in which "classical universalism", the concept of free access to all kinds of health care for all, could take root' (WHO 2010a: 13).

[3]This trend is described in detail in the WHO 2000 report.

7.1.2 The Evolution of Health Systems

The problems faced by health systems in developed countries are even more pronounced in poor countries. In almost all countries, the cost of health systems began to increase in the late 1960s, in line with the increased volume of hospital care. Health systems were mainly used by rich people and the efforts made to reach all sectors of the population were often unsuccessful.

The populations of developing countries are the first affected by the deficiencies of health systems. The health systems introduced by Western colonial powers in Africa and Asia and by national governments in Latin American countries generally excluded native populations. In Africa, health systems were essentially designed for colonial employees and expatriates. Charity organizations and public health programs were designed to provide health care to the vast majority of the population. However, the new health systems proved inefficient for a large proportion of the population, particularly in rural areas. Health centers and clinics were only accessible to populations in urban areas. The WHO indicates that in developing countries, two thirds of the health budget was spent on large urban hospitals covering just 10–20 % of the population. At least half of all hospital spending was devoted to the treatment of conditions relating to outpatient services, such as diarrhea, malaria, tuberculosis and acute respiratory infections.

In short, it soon became apparent that health systems needed to be reformed in order to improve their profitability, fairness and accessibility. A new wave of reforms began to promote primary health care aimed at affordable, universal coverage. The experience of countries such as South Africa and the Islamic Republic of Iran and through programs to eradicate diseases in the 1940s and the successes recorded in China, Cuba, Guatemala, Indonesia, Niger, and Tanzania served as models for other health care systems. Some of these countries, as well as Costa Rica and Sri Lanka, achieved good results at a low cost – such as increasing life expectancy at birth by 15–20 years in the space of two decades. In all cases, success was based on a minimum level of health services, but also on improvements in nutrition, education, drinking water and basic environmental sanitation.

The international conference on primary health care organized by the WHO and UNICEF and held in Alma-Ata in 1978 further reinforced the emphasis on primary health strategy aimed at achieving the objective of ‘health for all’.

7.1.3 Primary Health Care

Primary health care includes a range of basic health services and is based on the principles outlined at the Alma-Ata conference,[4] the most important of which are (WHO 2003):

– Universal access to care and coverage on the basis of need;
– Commitment to health equity as a part of development oriented to social justice;

[4] See in Annex 3 the Declaration of Alma-Ata in 1978.

– Community participation in defining and implementing health agendas;
– Intersectoral approaches to health.

There is no standard and universal definition of primary health care, as both a type of care and a global approach to health policy and service delivery (WHO 2003). In this sense, there is no single model of primary care that might serve as an example to follow. In many countries, the implementation of primary health care required training community health workers to provide basic health services in rural clinics to populations who previously had no access to modern health care.

The WHO estimates that many programs have been at least partial failures. 'Funding was inadequate; the workers had little time to spend on prevention and community outreach; their training and equipment were insufficient for the problems they confronted; and quality of care was often so poor as to be characterized as "primitive" rather than "primary", particularly when primary care was limited to the poor and to only the simplest services. […] Lower level services were often poorly utilized, and patients who could do so commonly bypassed the lower levels of the system to go directly to hospitals. Partly in consequence, countries continued to invest in tertiary, urban-based centres.' (WHO 2000: 15).

Primary health care has also been criticized for failing to meet the demand for health care services, which depends to a great extent on individuals' representations of the quality of health services and the capacity of health services to respond to demand, and to focus on supposed needs. If there is a discrepancy between needs and demands, health services cannot be adapted to both objectives, and the system is bound to fail. Poverty is not the only factor accounting for the gap between needs and demands, since there are many other factors, and the issue cannot be remedied simply by creating new health care facilities and widening the range of services.

Above all, primary health care must enable everyone, and in particular the poorest members of society, to access health care. However, in practice, primary health care services are often used by the richest members of society, and in many developing countries health care is not free. The efforts made in these countries to improve the health system currently face a number of difficulties. The WHO has identified four major difficulties requiring urgent reforms to improve access to care among the poorest members of society: the shortage of health workers, management of health information, funding and the role of the state.

7.2 The Shortage of Health Workers

The WHO defines health workers as 'all people whose main activity is to protect and improve health' (WHO 2006: 1). Human resources are at the heart of health systems and are the key to progress in health care quality and delivery. There is much evidence to suggest that the number and quality of health workers have a positive impact on infant, child and maternal survival. Conversely, child malnutrition has worsened as a result of staff cuts following health care reforms. Health workers are the key to improving the quality of care since they are best placed to identify

opportunities for innovation. The world is currently in the midst of a major crisis in this area. Health systems are faced with a shortage of personnel, and the most affected countries are developing countries, and in particular sub-Saharan African countries, where the needs are greatest.

7.2.1 The Shortage of Health Workers

The WHO estimates that in 2006 the total number of full-time health workers was 59.2 million people, working in public, private or faith-based health services or in NGOs. Two thirds are health service providers, while the remaining third are administrative and support staff. In low and middle-income countries, the proportion of health service providers is over 70 %, compared to 57 % in the Americas region. In sub-Saharan Africa, 83 % of health workers are health service providers. Sixty-five percent of the total number of health workers across the world work in Europe and the Americas, compared to just 3 % in Africa. Health workers are concentrated in the areas with the lowest burden of disease, while the smallest numbers can be found in regions with the highest burden of disease and the greatest health care needs. Despite representing just 10 % of the global burden of disease, Canada and the United States account for 37 % of the global number of health workers, while Africa, representing a quarter of the global morbidity burden, has just 2.3 % of the global number of health workers. The density of health workers ranges from 24 per 1,000 inhabitants in the United States to 2.3 per 1,000 inhabitants in Africa.

Health workers operate as part of health teams in which every member has specific skills and duties. In the case of health service providers, the WHO focuses, among others, on the ratio of nurses (and midwives) to doctors. The ratio ranges from 8 nurses for every doctor in Africa to 1.5 nurses for every doctor in the Western Pacific region. In Africa, the high ratio is explained by the low density of doctors per 1,000 inhabitants. In countries such as Chili, Peru and Mexico, there are more doctors than nurses.

There are inequalities of access to health care between different regions of the world, but also within countries. In its 2006 report, the WHO referred to the example of Vietnam, where there is barely more than one health worker per 1,000 inhabitants. However, 37 of the 61 provinces are below this average, while just one province has 4 health workers per 1,000 inhabitants. Many other countries are also affected by major regional disparities. Several factors account for the unequal distribution of health care. The proportion of health workers living in urban areas is higher than the proportion of the population living in urban areas – a trend observed in all countries regardless of income level. The areas where hospitals are based and where the population is able to pay for health services tend to attract more health workers than less well-equipped areas. Urban areas generally have the best infrastructures. While less than 55 % of the world population lives in urban areas, over 75 % of doctors and over 60 % of nurses work in urban areas. Rural areas are also affected by a significant shortage of female health workers, probably because a female health worker living

alone is often not safe in remote areas. Although traditional midwives and volunteer health workers in villages are, by contrast, predominantly female, they are not included in health statistics.

The coverage of essential health services is generally lower in areas with small numbers of health workers than in areas with higher densities of health workers. This correlation suggests that health is affected by health worker shortages. There are no standards for determining whether the number of health workers is sufficient to meet health care needs. However, the WHO has estimated the number of health workers required to achieve the Millennium Development Goals, highlighting the significant shortage of health workers in almost all low-income countries.

In order to estimate the shortage of health workers, the WHO begins from the assumption that on average, countries with less than 2.5 health professionals (doctors, nurses, midwives) per 1,000 inhabitants cannot cover 80 % of the needs related to childbirth care provided by qualified personnel or anti-measles vaccination. The method used by the WHO to measure health worker shortages is a minimum coverage rate of 80 % and an empirical method for determining the density of health workers to obtain the coverage rate. Fifty-seven countries are below this threshold and the 80 % coverage rate and are deemed to have an acute shortage of health workers. Thirty-six of these countries are located in sub-Saharan Africa. In 2006, the WHO estimated the shortage of health workers at around 4.3 million doctors, nurses, midwives and other personnel. In terms of staff numbers, the greatest shortages are in South and Southeast Asia, and in particular India, Bangladesh and Indonesia. The greatest relative shortage is in sub-Saharan Africa, where the number of health workers would need to be increased by 140 % to reach the minimum required threshold. These estimates highlight the importance of increasing the number of health workers to provide essential health services in the most impoverished countries. Staff number issues are made even worse by the imbalances between skill supply and the distribution of health workers. In many countries, staff skills are not adapted to local health needs and there is often a shortage of qualified personnel.

In recent years, there has been increasing concern among health policy-makers over health worker migration, between countries but also between regions of the same country. However, our understanding of these trends is limited. In the small number of countries that monitor migration, the available information is limited to doctors and qualified nursing personnel. While health professionals only represent a small proportion of migrants, health worker migration represents a major loss for health systems. Internal labor migration from rural to urban areas is common in these countries. Recent reports have provided evidence of migration flows from poor to rich countries within the same region, such as from Zambia to South Africa or from the United Republic of Tanzania to Botswana. The most worrying trend is the brain drain from the poorest countries of the South to rich countries in the North. The migration of doctors is the most notable trend, although the migration of nurses and other health professionals can have an equally harmful impact on health systems. Nurses are in high demand in developed countries because of population ageing.

The data on OECD countries show that doctors and nursing staff trained abroad represent a significant proportion of the total number of health workers in these

countries, particularly in English-speaking countries. Doctors trained in sub-Saharan Africa and working in OECD countries represent almost a quarter of the total number of doctors present in the countries of origin. The proportion of doctors trained in Africa and working in an OECD country ranges from 3 % in Cameroon to 37 % in South Africa. For nurses and midwives, the average proportions are 5 % of the personnel of the country of origin, although percentages range from 0.1 % in Uganda to 34 % in Zimbabwe.

The search for a better life and a higher income is the main factor accounting for these trends. The push factors of migration traditionally include social discontent and dissatisfaction with working and living conditions, while the pull factors of migration include an awareness of better employment opportunities elsewhere and the desire to take advantage of them. A study conducted in sub-Saharan Africa in 2006 showed that the determinants of migration are all equally important. The factors determining migration cited by health workers include concerns over the lack of promotion opportunities, mediocre management, heavy workloads, a lack of means, declining health services, unsatisfactory living conditions and high rates of crime and violence. The prospect of higher pay, the possibility of further training, and a safer environment were cited as the main pull factors. In Zimbabwe in 2006, 77 % of medical students at the end of their studies were encouraged by their family to emigrate. When a country has a weakened health system, staff shortages can cause the system to collapse, and the consequences are measured in lost human lives.

7.2.2 Strategies in the Battle Against Staff Shortages

In order to manage the shortage of health workers, the aim is simple: '*to get the right workers with the right skills in the right place doing the right things!* – and in so doing, to retain the agility to respond to crises, to meet current gaps, and to anticipate the future' (WHO 2006: xx). Human resource strategies need to be adapted to the specific characteristics of each country. A universally applicable model is neither required nor desirable. Any human resource strategy must cover all aspects of the professional careers of health workers, i.e. entry into the profession, working life and exit from the profession.

In order to reach the objectives of primary health care, new training systems need to be developed to ensure that the skills of health workers are adapted to the needs of the country. The provision of training to students in prestigious medical schools and universities in developed countries is only necessary if there is no alternative at a local or regional level. The skills of public health workers need to be improved based on a new approach to national training promoting new types of services focused to a greater extent on primary health care. The number of doctors can be supplemented by training nurses, 'assistant doctors' and intermediate level professionals capable of carrying out duties traditionally performed by medical doctors. Several studies carried out in developed countries have shown that nurses can reduce health

costs without having an adverse effect on health, and may even improve it. In some developing countries, community health workers are trained to provide specific and priority care, enabling them to reach populations with no access to traditional health services.

As a result of these developments, a number of countries have set up public health schools. Public health schools perform six basic duties: general administration and institutional governance, training, staff recruitment and selection, training funding, development and maintenance of infrastructures and technologies, and data production. In South Asia, a public health initiative was launched in 2004 to improve public health planning. In Bangladesh, the Public Health School aims to train professionals to improve the health of the most disadvantaged populations in the world. A Public Health Foundation has also been set up in India in partnership with the Health Ministry and the private sector in order to create five public health schools distributed across the national territory (WHO 2006).

Managing staff shortages also requires a more effective management of existing human resources to improve their efficiency. The WHO has proposed a range of practical and low-cost strategies to achieve this objective. There are three types of resources: those relating to work, those aimed at support systems, and those aimed at creating a favorable work environment. In many countries, health workers have no specific job title or description and team management is limited. In Indonesia, a program implemented by the WHO and the Ministry of Health showed that nurses and midwives were more likely to comply with rules and were happier in their work when operating under clear rules. In poor countries, professional values are not always complied with and it is not uncommon to see health workers supplementing their income in various ways, including by selling pharmaceutical products. Health workers will perform their tasks more efficiently if these match their skills and if working conditions are satisfactory (infrastructures, vehicles, supplies, etc.). Health workers must also have access to continuing training in the workplace, which, however brief, helps to promote the diffusion of innovations among staff. These measures should also help to limit health worker migration and the resulting imbalances.

Pay has a significant impact on care quality and performance. In many countries, health workers are paid less than workers in equivalent professions. In most developing countries, engineers earn more than doctors. In order to remedy this issue, a number of countries have increased the wages of public sector health workers in recent years. In the United Republic of Tanzania, some groups have benefited from a selective program of accelerated wage increase. In Uganda, nurses at the bottom of the pay scale have seen their pay almost double since 2004. As a result, Ugandan nurses now earn as much as recent university graduates. Health workers are often not paid (particularly in Africa) because of a lack of funds or because the existing human resource management system is ineffective. Other strategies can be used besides pay increases. These include financial benefits such as performance bonuses during vaccination campaigns and non-financial benefits in the form of free accommodation, free electricity, free continuing training, and promotion. In Jamaica, nurses receive benefit packages that include health insurance, paid holidays and free

transport (WHO 2006). In Botswana, benefits include housing, car rentals and medical care. In Senegal, nurses in rural areas are provided with mopeds in order to limit their isolation.

Financial and non-financial incentives can also be used to reduce imbalances in the geographical distribution of health workers. For example, Thailand uses various types of additional pay for doctors, nurses, chemists and hospital dentists working in rural areas. In 1986, Mali introduced a program aimed at inciting newly-qualified doctors to work in poorly-served areas. Incentives include extra pay, free accommodation, training, equipment, and means of transport. In Indonesia, performance bonuses of up to 100 % have been used as a strategy to draw doctors away from Jakarta toward peripheral areas.

The fight against 'informal' fees is a more complex issue. However, some countries have sought to remedy the problem. The program applied in health centers in Cameroon determines the unique payment location, the level of fees and the accepted payment methods. Patients know who to turn to in the event of an infraction and the performance bonuses of dishonest health workers are withheld.

Solving the crisis requires taking into account all the relevant needs in this area, from training to morale. The WHO has a major role to play in this area.

7.3 Health System Funding and the Role of the State

Ensuring the effectiveness of a high-quality health system accessible to all requires the introduction of viable funding mechanisms. Global health expenditures have increased significantly over the past 30 years, largely as a result of technological progress and the complexity of funding and health service institutions. The increase in health expenditures has been particularly significant in developed countries. By contrast, in the poorest countries, the increase in health expenditures has been very slow and, in some cases, nonexistent.

The geographical distribution of health expenditures across the different regions of the world is highly unequal. The 30 countries of the OECD, representing less than 20 % of the world population and just 10 % of the total burden of disease, account for 90 % of global health expenditures. By contrast, with 30 % of the total burden of disease, Africa commands just 1 % of global health expenditures.

In rich countries (i.e. countries with a per capita income above US$ 8,000), approximately 8 % of the gross domestic product is allocated to health, representing an annual per capita expenditure of between US$ 1,000 and US$ 4,000. Middle-income countries (between US$ 1,000 and US$ 8,000 per capita) allocate between 3 and 7 % of the gross domestic product to health, amounting to an annual expenditure of US$ 75–550 per capita. In the poorest countries, where the national income per capita is below US$ 1,000, between 1 and 3 % of the gross domestic product is allocated to heath and health expenditures are below US$ 50 per capita.

There have been three major trends in the relationship between life expectancy at birth and economic growth over the last 30 years (WHO 2008). High-income

countries have experienced increased economic growth and seen their life expectancy increase. However, the most significant progress has been in a number of low-income countries in Asia (including India), Latin America and North Africa, with a population estimated at 1.1 billion in 1978, compared to 2 billion in 2008. In these countries, life expectancy at birth has increased by 12 years, while GDP per capita has more than doubled (2.6). In other regions of the world and in China, economic growth has not been accompanied by a significant increase in life expectancy. Before 1980, China had already experienced a significant increase in life expectancy, well ahead of other low-income countries. However, while the average GDP per capita has increased significantly since then, access to care and social protection has declined, particularly in rural areas.

For 10 % of the world population living in low-income countries, GDP and life expectancy have remained stable over the past three decades. These countries are known as 'fragile states' (struggling low-income countries), and two thirds of their population live in Africa. Often affected by poor governance and internal conflict, these countries face similar difficulties: low level of security, corruption, social divide, absence of the rule of law, and lack of mechanisms for restoring a legitimate political authority. They lack the public resources to meet the needs of the country, causing them to lose even more ground in terms of public investments. In these countries, life expectancy at birth was among the lowest in the world in 1975, and there has only been a very limited increase since then. Other low-income countries in sub-Saharan Africa countries have experienced similar difficulties. In these countries, populations lack the material security to enable them to invest in health care, while governments have neither the resources nor the political will to invest in the public sector.

The resources allocated to health care suffer as a result of poor economic growth. The example of sub-Saharan Africa is particularly striking. Between 1980 and 1994, GDP per capita in sub-Saharan Africa declined almost every year, offering limited prospects for improving health systems and access to care. In the Democratic Republic of Congo, there was no budget for health care in the early 1980s, and public expenditures in health districts dropped to below US$ 0.1 per capita. In Zambia, the public health budget has decreased by two thirds, while in countries such as Cameroon, Ghana, Sudan and the United Republic of Tanzania, the budget allocated to public health staff (despite increasing) and health system expenditures have decreased by up to 70 % since 1980. Throughout the 1980s and 1990s, the health systems in these countries were badly affected by decreasing public spending and disinvestment. In 2005, health expenditures were below $I 100 dollars in 45 countries, while in 16 high-income countries, health spending rose to above $I 3,000 (WHO 2008). Low-income countries generally allocate a smaller proportion of their GDP to health care than high-income countries, despite having a greater burden of disease.

One of the effects of inadequate resources has been the increased commercialization of health care in most low and middle-income countries. The WHO defines the commercialization of health care as 'as the unregulated fee-for-service sale of health care, regardless of whether or not it is supplied by public, private or NGO providers'

(WHO 2008: 14). The commercialization of health care is already a major trend in countries without the capacity to regulate their health sector. For-profit health services are offered on a small scale by many independent providers dominating the health sector from sub-Saharan Africa to Asia. The private sector is not the worst affected sector. In many public institutions and in those run by NGOs, patients pay for services through informal payment systems.

The commercialization of health care has an impact on the quality and accessibility of care. People without sufficient means are excluded from health care, while those who do have access to care often receive the most expensive (though not necessarily the most appropriate) care. In this sense, commercialization makes health systems very expensive and ineffective: commercialization increases health inequalities and leads to poor, and in some cases dangerous, health care. For example, in the Democratic Republic of Congo, some health workers perform appendectomies and other surgical interventions at exorbitant prices on the black market at the patient's home. The result is that confidence in health services declines, as does public confidence in the capacity of the health authorities to protect the population. This trend has attracted increasing concern from political leaders and is one of the main reasons for supporting reforms aimed at improving the capacity of health systems to cope with current health problems, but also their capacity to meet the demands of the population.

In developing countries, the current funding systems are a major obstacle to universal access to care. Many of these countries, particularly in Southeast Asia and sub-Saharan Africa, allocate limited resources to the public sector, and populations are required to pay for their health care out of their own pocket. Every year, over 150 million people in 44 million households are forced to pay excessive fees for their health care compared to their resources, simply because there is no social protection or prepayment system (Vaillant and Salem 2008). A shortage of health workers and equipment means that other priorities such as the introduction of social protection for the poorest become secondary issues. Struggling households can be forced to give up on basic needs and care, sinking as a result into illness and poverty.

To ensure that the direct payment of health care services is not an obstacle to access to care and is not an insurmountable financial burden for households, governments need to develop appropriate public policies. Policies in this area must be pragmatic and must take into account the context of health needs and their impact on access to quality services. For example, Uganda was able to put an end to direct payments by increasing public financial and administrative support. Other funding sources can also be used to improve health. In low-income countries, the WHO recommends taxation as a way of strengthening the role of the public authorities, since a taxation system is easier to manage than insurance regimes. This is dependent on funds being effectively allocated to health services and being used appropriately.

New financial resources have begun to emerge in the area of health, particularly in sub-Saharan Africa. In order to manage these funds efficiently and use them as effectively as possible to improve health outcomes, the main deficiencies of the

system (in the area of human resources) need to be overcome. There have been encouraging results in this area in Mali and Mauritania.

7.4 Persistently Inadequate Health Information

Health data and information are vital for health systems, to ensure 'that the health needs of populations, especially those that are poor and marginalized, can be understood; to ensure that programs are reaching those most in need; to measure the effects of interventions; and to assess and improve performance' (WHO 2003: 116). At the time of the Alma-Ata declaration, the available data on developing countries were limited.

Since then, there has been some progress. General population health surveys have been developed, providing data on the determinants of health, the general health situation and the use of health services. However, the data on developing countries continue to be dogged by significant deficiencies. Adult mortality data remain limited, both in terms of the levels of risk and in terms of the causes of death. Infection-related morbidity is also poorly measured. There is also very little data on access to care, a key indicator for measuring health-system equity. The quality of health data varies significantly, while definitions and methods are often poorly coordinated. In addition, where health data are available, they are seldom used to manage health services at a local level and to develop national policies. Very few countries have effective health information systems. Data collection and analysis are often carried out as part of international initiatives.

In the context of health systems based on primary health care, the WHO defines a health information system as 'an integrated effort to collect, process, report and use health information and knowledge to influence policy-making, program action, and research' (WHO 2003: 116).

First, it is essential to carry out regular and accurate data collections on basic demographic trends in order to support the development of rational health policies. However, national vital statistics records cover less than a third of the global number of estimated deaths. While coverage is almost universal in developed countries, in Southeast Asia and Africa, the coverage rate is just 10 %. However, there has been some progress, and recent efforts have resulted in the introduction of cheaper and more reliable methods than the systematic recording of death certificates. Data on the deaths of siblings or household members are collected during surveys on population samples or during censuses. These methods can improve the coverage of demographic events when resources are limited and have been widely used in China and India, but also in the United Republic of Tanzania, and are currently in the process of being developed in other countries. The data provided by household surveys are based on the responses of participants, which may affect their reliability and validity and limit their comparability across populations. In total, every year, approximately 40 % of births and almost 70 % of deaths are not recorded. The WHO has reliable statistics on the causes of death from just 31 member states

(out of a total of 193). As noted by the WHO Director-General, Dr Margaret Chan, in a speech delivered at the Global Forum for Health Research held in Beijing in November 2007, 'there is no United Nations body specifically responsible for monitoring birth and death trends, which explains why this activity has tended to slip through the net. This is why we have been unable to develop, support and maintain vital records systems in developing countries over the last 30 years. Yet without these statistics, we will only have an incomplete view of the impact of the 120 billion dollars spent every year on public development aid'.

Nevertheless, recent efforts have had positive results. Increased national capacities in some countries have allowed for new data collections and increased the frequency of data collections. The 2010 Millennium Development Goals report published by the United Nations found that in 2009, 118 countries had data for at least two points in time for between 16 and 22 indicators, compared to just four countries in 2003. The number of countries with at least two data sets on the prevalence of contraceptive use increased from 50 in the period 1986–1994 to 94 in the period 1995–2004. Over the same period, the number of countries with no data for this indicator dropped from 106 to 63. The production of high-quality data also extends to other areas, such as the monitoring of HIV/AIDS, which has helped to improve our understanding of the epidemic. Between 2003 and 2008, 87 developing countries conducted nationally representative surveys to collect complete and accurate data on HIV among young women, compared to 48 in 1998–2002 and five before 1998. Even in areas where data collection tools are less well-established, such as the environment, data collections by national or regional authorities have improved significantly (United Nations 2010).

Data from vital statistics, censuses, household surveys, epidemiological studies, and service providers often provide an incomplete view of the value of a population health indicator. However, data need to be as complete as possible since they are used as a basis for strategic decisions, policy implementation and management, implementation monitoring and the assessment of policy effectiveness. Where data are unreliable, incomplete or inconsistent, models are used to make the best possible estimates. The models used to estimate life tables are well-known. Others are being developed to estimate the prevalence, incidence and case-fatality of diseases at a national, regional and global level, but also at a local level.

The efforts made to improve health systems over the last decade have given an increasingly important role to the decentralization of resources and decision-making in favor of local authorities. At a local level, this requires effective health information systems. Individuals and households must be involved in the production, dissemination and use of health information. One of the fundamental principles of the Alma-Ata declaration is to involve individuals 'in planning, organizing, running and controlling primary health care'.

Greater equity in health (another key principle of primary health care) is dependent on the ability to develop an accurate understanding of inequalities of access to health care, risk factors, and the most disadvantaged groups. Data collection in these areas remains limited in many countries. The global health survey launched by the WHO in 2001 in the context of household surveys aims to collect reliable and

comparable data on population health and the performance of health systems as part of the Millennium Development Goals.

In order to respond to the need for information among health professionals, researchers and policy-makers in developing countries, the UN Millennium Action Plan launched the Health InterNetwork Access to Research Initiative (HINARI), led by the WHO. Created in 2000, HINARI has contributed to improving health by using the Internet to increase the flow of health information (WHO 2003). HINARI provides a vast online database for use by staff working in ministerial departments, teaching and research institutions and non-profit organizations. The five priority areas are: scientific and biomedical journals, educational and training resources, information on health policies, statistical data and public software for the administration of public health and clinical management.

The improvement of data systems requires a collaborative effort. In 2004, the WHO launched the Health Metrics Network (HMN), aimed at improving the availability and use of reliable health information 'for the implementation of policies, the monitoring and assessment of programs, the assessment of international targets and the assessment of equity in health'. The Health Metrics Network is a partnership involving a wide range of organizations, including the WHO, international organizations, bilateral organizations, foundations, ministries of health, statistics services, university institutions and organizations representing civil society. The network aims primarily to bring together health and statistics experts in order to promote and develop the skills and know-how required to increase the availability, quality, dissemination and use of data for decision-making purposes. In June 2010, 83 countries (almost 70 % of low and middle-income countries) had joined the network to improve their national health information systems.

7.5 The Renewal of Primary Health Care

Since the Alma-Ata declaration, major progress has been made in the area of health. However, health systems are not as efficient as they need to be to meet the needs of the population. In the World Health Report 2008, the WHO emphasized the need to reform the values and practices of health systems based on primary care.

7.5.1 The Challenges of a Changing World

Over the last 30 years, there has been significant global progress. However, this progress has been unequal across regions and countries. A significant number of countries are still lagging behind, with some even losing ground. In some countries, the gap between the most privileged and the most disadvantaged social groups has widened. The decline of mortality among children under five has been much slower in low-income countries, with less than a 70 % decline since 1975. In many African

countries, child mortality has stagnated and even increased. Throughout the world, 20 of the 25 countries where child mortality is two thirds of what it was in 1975 are in sub-Saharan Africa. The slow progress in this area is explained by unequal access to care. For example, in sub-Saharan Africa, the vaccination coverage rate is significantly below the coverage rate in the rest of the world. The prevalence of contraceptive use is just 21 %, compared to 61 % in other developing countries (WHO 2008). The increased use of contraception has been accompanied everywhere by a decrease in abortions. However, in sub-Saharan Africa, the number of abortions has increased, and abortions are almost always performed in unsafe conditions. In sub-Saharan Africa, there has also been no improvement in access to qualified personnel during childbirth. The difference in life expectancy at birth between high-income countries and sub-Saharan African countries increased by almost 4 years between the mid 1970s and 2005. These reminders of the health situation are indicative of the deficiencies of health systems and highlight the need for reform.

Health systems must also adapt to a changing world and to new health challenges. Thirty years ago, it would have been inconceivable to think that African children would one day be more likely to die of a road accident than their European counterparts. The changes that are currently underway across the world have had, and will have, a profound impact on health. The urbanization of the population has accelerated, and the trend is expected to continue. Today, half of the world population lives in urban areas (3.3 billion people). The number of city dwellers is predicted to reach almost five billion by 2030. The increase will mainly be in the urban areas of developing countries and in the major cities of South and East Asia. Nonetheless, the average health indicators are better in urban areas compared to rural areas, although social and economic stratification in urban areas produces major health inequalities. For example, in Nairobi, the infant mortality rate in the richest neighborhoods is below 15‰, compared to 254‰ in the Embakasi slum. A third of the urban population lives in slums, where there are no stone or brick houses, no access to drinking water and no access to sanitation facilities. A significant proportion of the 200 million international migrants across the world also live in these urban areas. In some countries, non-nationals still do not have the same health rights as nationals. In addition to urbanization, another major trend is population ageing. In low-income countries, population ageing is increasing before the population has access to wealth. In 2050, 85 % of the two billion people aged 60 and over will live in countries that are currently developing (mainly in urban areas).

Urbanization, population ageing and changing lifestyles have resulted in an increase of chronic and non-communicable diseases, particularly diabetes, cancer and cardiovascular disease, and injuries. Developing countries are also affected. In Africa, smoking, hypertension and hypercholesterolemia are among the ten leading causes of morbidity. The lack of progress over the past 30 years and declining life expectancies are largely related to health problems among adults. Adult health is expected to become one of the major health issues in the years to come, particularly since the prevalence of certain conditions is currently on the increase. In developing countries, these conditions are less well-known because of a lack of information, but are almost certainly underestimated. Diseases of poverty are all closely linked, with many

common causes that have a combined negative impact on health. Taking into account comorbidity is as important in developing countries as it is in developed countries. Health systems will need to deal with the rise of chronic diseases, despite not having completed their programs aimed at combating communicable diseases and improving maternal and child health. It is difficult to estimate the impact that these changes will have on population health, although a change in the burden of disease, increased health inequalities and a loss of resilience of the health sector seem likely.

Health systems have not been immune from the political and economic crises that have challenged the capacity of the state and institutions to ensure access and to provide funding and services. The boundary between the private and public sectors has become increasingly blurred as a result of the commercialization of health care. The negotiation of rights has become increasingly politicized. Information has transformed the relationships between citizens, professionals and politicians. The response of the public sector to global changes has often been inadequate. Over the past decades, health systems have been unable to predict, prepare and adapt to these changes. Although the resources allocated to health care have increased steadily over the past decade, many national health systems remain underfunded and have not become fairer or more efficient. There has been an increasing emphasis on short-term priorities and health systems have become increasingly fragmented.

As noted by the WHO, health systems have failed to promote the objectives of health for all through primary health care outlined in the Alma-Ata declaration. The WHO has highlighted three worrying trends: the disproportionate emphasis on a limited provision of curative health care services; the fragmentation of service provision driven by the need for short-term results; and the uncontrolled commercialization of health care, as a result of a degree of laissez-faire. Health systems have thus failed to provide a comprehensive and balanced response to health needs.

Users are becoming increasingly demanding on health systems. Their demands cover a number of areas, including greater equity in health, an end to exclusion, and patient-centered health care. People in the developing world, like the populations of developed countries, expect health systems to meet their needs, to respect their beliefs and to take into account their particular circumstances. Health workers are expected to be understanding, respectful and trustworthy. It is now widely accepted that the solution to health problems requires taking into account the sociocultural situation of families. Developing countries have not made sufficient efforts to develop patient-centered health care. According to the WHO, the only way of reducing social exclusion and of ensuring that patients are not at the mercy of the commercialization of health care is to promote patient-centered health care.

There is also a general tendency to believe that the public authorities have an obligation to protect the population from health threats. These are not limited to the quality of water and sanitation services. Following the Ottawa Charter for Health Promotion in 2006, the emergency health action programme includes a much wider range of issues, including food safety, environment and lifestyle-related risks and the influence of the social environment on health and quality of life. In recent years, there has also been increasing concern over the security of patients.

Table 7.1 Evolution of health primary care

Early attempts at implementing PHC	Current concerns of PHC reforms
Extended access to a basic package of health interventions and essential drugs for the rural poor	Transformation and regulation of existing health systems, aiming for universal access and social health protection
Concentration on mother and child health	Dealing with the health of everyone in the community
Focus on a small number of selected diseases, primarily infectious and acute	A comprehensive response to people's expectations and needs, spanning the range of risks and illnesses
Improvement of hygiene, water, sanitation and health education at village level	Promotion of healthier lifestyles and mitigation of the health effects of social and environmental hazards
Simple technology for volunteer, non-professional community health workers	Teams of health workers facilitating access to and appropriate use of technology and medicines
Participation as the mobilization of local resources and health-centre management through local health committees	Institutionalized participation of civil society in policy dialogue and accountability mechanisms
Government-funded and delivered services with a centralized top-down management	Pluralistic health systems operating in a globalized context
Management of growing scarcity and downsizing	Guiding the growth of resources for health towards universal coverage
Bilateral aid and technical assistance	Global solidarity and joint learning
Primary care as the antithesis of the hospital	Primary care as coordinator of a comprehensive response at all levels
PHC is cheap and requires only a modest investment	PHC is not cheap: it requires considerable investment, but it provides better value for money than its alternatives

Source: WHO (2008: 10)

In line with the values promoted by the Alma-Ata declaration, these expectations give an added social and political impetus to the current movement toward primary health care and health system reform. 'The necessary reorientation of health systems has to be based on sound scientific evidence and on rational management of uncertainty, but it should also integrate what people expect of health and health care for themselves, their families and their society' (WHO 2008: 9).

7.5.2 Primary Health Care Reforms

Although there have been several attempts to implement primary health care, they have not always resulted in effective health system reforms in line with current issues, as shown by the WHO (Table 7.1). It is now widely recognized that what is needed is a whole series of reforms to meet current health challenges and to prepare for the future. 'This requires delicate trade-offs and negotiation with multiple stakeholders that imply a stark departure from the linear, top-down models of the

past. Thus, PHC reforms today are neither primarily defined by the component elements they address, nor merely by the choice of disease control interventions to be scaled up, but by the social dynamics that define the role of health systems in society' (WHO 2008: 9).

The proposed reforms are organized in four groups (WHO 2008: 9):

- Universal coverage reforms to improve health equity;
- Service delivery reforms to make health systems people-centred;
- Leadership reforms to make health authorities more reliable;
- Public policy reforms to promote and protect the health of communities.

The first set of reforms aims to reduce health inequalities and to promote universal access to health care and social security. The obstacles are not only financial, but also relate to the availability and quality of services and to a range of socio-cultural factors (language, sex, religion). Reducing inequalities requires providing services to all. In many countries, the existing infrastructures are inadequate. Therefore, health service networks need to be extended. 'User fees, in particular, are important sources of exclusion from needed care. Moreover, when people have to purchase health care at a price that is beyond their means, a health problem can quickly precipitate them into poverty or bankruptcy' (WHO 2008: 10). The extension of health care coverage must go hand in hand with a social security system based on prepaid contributions that ensures universal coverage, including those not yet covered. To achieve these objectives, service delivery reforms (second group) are essential.

The aim of 'service delivery reforms' is to turn conventional health services into primary health care by promoting fairness and meeting the expectations of the population by 'putting people at the centre of health care, harmonizing mind and body, people and systems'. Primary health care has been gradually simplified. We need to return to the essence of primary care (see Box). According to the WHO, people-centered care requires appropriate health services 'that are organized accordingly, with close-to-client multidisciplinary teams that are responsible for a defined population, collaborate with social services and other sectors, and coordinate the contributions of hospitals, specialists and community organizations'. Developing countries are currently expanding their delivery and have the capacity to commit to policies that will enable them to avoid the mistakes of high-income countries.

The third group of reforms is a response to popular pressure on governments to implement public policies aimed at meeting the health challenges posed by urbanization, discrimination and social stratification. Primary health care policies need to be supplemented by public health interventions at a national level. It has been demonstrated that acting at a national level makes a significant contribution to health, based on interventions ranging from public hygiene to disease prevention and health promotion. Yet these types of interventions are often overlooked, particularly in periods of crisis and threats to public health. Public policies need to focus on health systems – i.e. drugs, technologies or human resources. However, they also need to be extended to sectors other than health. Educational programs, food and consumer goods safety, access to drinking water, and the transport of toxic waste are all factors determining population health. Health must be taken into consideration in all policies.

Implementing such reforms will require reinvesting in the public authorities in collaboration with all stakeholders. Health governance is a key aspect of the reforms. Today, it is not enough to merely manage health systems. The health authorities need to be more open and transparent and to cooperate with partners beyond the public sector, from clinicians to civil society, local authorities, researchers and the academic world. The point is also to invest in strategic areas such as health information systems, an absolute necessity for reforming primary health care. Societies will also need to take advantage of innovations in the health sector and to increase capacities by sharing experience, both within and beyond national borders.

Primary care has been defined, described and studied extensively in well-resourced contexts, often with reference to physicians with a specialization in family medicine or general practice. These descriptions provide a far more ambitious agenda than the unacceptably restrictive and off-putting primary-care recipes that have been touted for low-income countries:

- *primary care provides a place to which people can bring a wide range of health problems – it is not acceptable that in low-income countries primary care would only deal with a few "priority diseases;*
- *primary care is a hub from which patients are guided through the health system – it is not acceptable that, in low-income countries, primary care would be reduced to a stand-alone health post or isolated community-health worker;*
- *primary care facilitates ongoing relationships between patients and clinicians, within which patients participate in decision-making about their health and health care; it builds bridges between personal health care and patients' families and communities – it is not acceptable that, in low-income countries, primary care would be restricted to a one-way delivery channel for priority health interventions;*
- *primary care opens opportunities for disease prevention and health promotion as well as early detection of disease – it is not acceptable that, in low-income countries, primary care would just be about treating common ailments;*
- *primary care requires teams of health professionals: physicians, nurse practitioners, and assistants with specific and sophisticated biomedical and social skills – it is not acceptable that, in low-income countries, primary care would be synonymous with low-tech, non-professional care for the rural poor who cannot afford any better;*
- *primary care requires adequate resources and investment, and can then provide much better value for money than its alternatives – it is not acceptable that, in low-income countries, primary care would have to be financed through out-of-pocket payments on the erroneous assumption that it is cheap and the poor should be able to afford it.*

(Source: WHO 2008: 11)

The four sets of reforms are based on common values and challenges, but cannot be implemented in the same way in all countries. In high-income countries, the available funds are still significant enough to accelerate the transition from tertiary to primary health care. The same applies to the three billion people living in countries where the rapid growth of health economies provides a foundation for health systems based on high-quality care and universal coverage, without repeating the mistakes of the past. The challenge will be greater for the two billion living in sub-Saharan Africa and South and Southeast Asia and for the 500 million other people living in fragile states. However, these countries cannot afford not to opt for primary health care.

In order to support the efforts of developing countries, international aid and solidarity remain essential, although they will become increasingly less important as trade, common training standards and global governance continue to develop. Most developing countries have already made the transition and are no longer dependent on aid. While international cooperation can facilitate the transformation of health systems by channeling aid, real progress will come from better health governance.

7.6 Conclusion

Population health is heavily dependent on the existence of health systems capable of ensuring universal access to high-quality care. In order to promote 'health for all by the year 2000', the 1978 Alma-Ata declaration defined the main principles of primary health care: 'Universal access to care and coverage on the basis of need; Commitment to health equity as a part of development oriented to social justice; Community participation in defining and implementing health agendas; Intersectoral approaches to health.'

Over the past three decades, health systems have been unable to bridge the gap between the rich and the poor. Instead, the gap has widened. The implementation of primary health care has encountered many difficulties. The lack of financial resources remains a major problem. In almost 20 % of WHO member states, per capita health spending is below US$ 15. In many countries, particularly poor countries, families are still required to pay for health care out of their own pocket. Health systems are suffering from a major human resource crisis in terms of health worker training and the distribution and retention of health workers. Health systems have also been badly affected by health worker migration.

There has also been significant resistance (if only passive) to any major redeployment of existing resources. Most governments have adopted health policies based on the primary care approach, although the implementation of these policies has been limited and has almost never resulted in the major policy overhaul needed to achieve the anticipated results. The lack of health information also means that health systems face serious risks.

In short, health systems are not as effective as they could and should be. In addition to the problems faced by health care services, health systems face new

challenges posed by a changing world marked by urbanization, population ageing and globalization. There has been an increase in health inequalities and health systems have been unable to respond to the increasing demands of the population.

In an attempt to respond to current needs, the WHO recently introduced a series of health reforms based on the values and principles of primary health care and relating to four main areas. Health systems need to promote universal access to care as part of an emphasis on equity and social justice, and should also seek to put an end to social exclusion. They must be patient-centered – meaning that health care provision should be organized around the needs and demands of the population. In addition, public policies should concern all sectors, and not the only the health sector. Health governance should be open and transparent and must involve a wide range of partners.

Health has always been a major concern of the international community. Health reforms offer new opportunities for making health policies more effective. Today, national health authorities are no longer only responsible for ensuring survival and fighting against diseases, but also view their health care responsibilities as one of the key areas to which populations and societies assign value. The legitimacy of health authorities will depend on their ability to implement health sector reforms in line with what society expects health systems to provide.

Conclusion

‘Health for All’: A Major Challenge

Population health is an essential component of human and social development, and is both a means and an end of development. Conversely, poor population health can be a major obstacle to social and economic development. As a result, health has emerged as one of the key issues at the center of international debates. The WHO slogan ‘Health for all by 2000’ reflects the spirit of a general movement in favor of health promotion throughout the world. The International Conference on Population and Development, held in Cairo in September 1994, established that ‘any individual has the right to enjoy the best possible state of physical and mental health’ (United Nations 1995). Health improvement also lies at the heart of three of the eight Millennium Development Goals (MDG) defined by the United Nations in 2000: the reduction of mortality, particularly among women and children, the improvement of maternal health, and the fight against epidemics such as AIDS, malaria and tuberculosis.

While population health in developing countries has clearly improved over the last decade, there remains much to be done to tackle the wide range of health issues and inequalities affecting many parts of the world, especially in sub-Saharan Africa. Child and maternal mortality, the high prevalence of AIDS, the continued prevalence of infectious diseases, and the emergence of new health risks all represent major challenges that these countries will need to address in the decades ahead.

Life expectancy has increased in most developing countries, but in many countries remains below the target age of 65 to be reached by 2005. In sub-Saharan countries, men and women live 30 years less on average compared to Western Europe and Japan. As a result of the impact of AIDS and war, a number of countries in sub-Saharan Africa have seen their life expectancy stagnate or decline in recent decades. While it is well underway in Latin America and the Caribbean, the health transition in Africa is still in its early stages. The situation in Asia is also extremely varied, with some cases of remarkable progress (China, Korea) and slower progress

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in South Asia (India, Bangladesh). The majority of countries in tropical Africa appear to have been excluded from the period of rapid progress enjoyed by Third World countries that have already been through the health transition process (Meslé and Vallin 2005).

Despite decreasing globally, the decline of child mortality remains limited in many countries. Child mortality rates are currently stagnating in 29 countries and increasing in 14 countries, and are closely linked to poverty. However, preventive measures such as large-scale vaccination campaigns appear to have had a positive impact, particularly in reducing the number of deaths caused by measles. Information and awareness campaigns also play a key role, going hand in hand with environmental sanitation and the treatment of infections. The decline of infant-juvenile mortality, particularly among the poorest populations, is dependent on the improvement of water supply and environmental sanitation. However, progress will remain limited as long as these vital services fail to reach those most in need (United Nations 2007). The education of girls and mothers is also a key factor in saving the lives of children, as shown by a number of recent studies. Family health care has traditionally been the responsibility of women. As a result, when women have no access to modern medicine, the entire family is affected (Pinnelli 2004).

Despite recent improvements, maternal health remains a major issue. Pregnancy and childbirth and their potential consequences are the main causes of death, disease and disability among women of childbearing age. The WHO estimates that every year, over 500,000 women (for the most part in sub-Saharan Africa and Asia) die as a result of complications during pregnancy or childbirth that could have been treated. In sub-Saharan Africa, a woman has a 1 in 16 chance of dying as a result of complications during pregnancy or childbirth, compared to a 1 in 3,800 chance in developed countries. The reduction of mortality rates among women requires universal access to reproductive health care, including family planning. Many female deaths (a quarter of maternal deaths, according to the WHO) could be avoided by preventing unwanted pregnancies, which would help to limit the number of abortions performed in poor conditions. Every woman must have access to medical assistance during childbirth and must, in the event of complications, have quick access to an equipped medical facility. While the medicalization of childbirth has improved in South Asia (Bangladesh) and North Africa (Egypt), there has been no improvement in sub-Saharan Africa.

AIDS also remains a major health emergency. The number of people infected with AIDS and dying from it has increased at such a rate that treatment services have been unable to keep up with the growing demand for care. In many countries, the AIDS epidemic has created a state of economic emergency that has undermined development. Eradicating AIDS will require access to cheap preventive and curative medicine and increased efforts to promote safe sexual practices. The spread of AIDS is a particular concern since its interactions with other diseases cause serious public health problems. Among adults, HIV infection increases the prevalence and severity of malaria and causes major changes in the epidemiology of tuberculosis. Though widely thought to have been eradicated, tuberculosis has reappeared with drug-resistant strains of TB and, in combination with the AIDS epidemic and the

increasing number of people living in poor socio-economic conditions, is expected to increase in scale and severity in the years ahead.

Amid rapid population growth, changing lifestyles in the second half of the twentieth century have had a significant impact on the development or resurgence of infectious and parasitic diseases such as cholera, malaria, yellow fever, dengue fever, diphtheria, and diseases caused by antibiotic-resistant bacteria. According to United Nations estimates, the countries most affected by AIDS are expected to match the life expectancy of other countries by 2015–2050. Estimates suggest that developing countries will not only be able to eradicate AIDS, but that the progress they will make between 2025 and 2050 will be proportional to the decline up to 2025. However, France Meslé and Jacques Vallin argued that there is no evidence to suggest that all of the countries badly affected by AIDS will be able to emerge from the crisis at the same rate. The epidemic continues to spread in many countries and the factors contributing to the stabilization or decline of HIV/AIDS have yet to be identified – an issue made worse by the fact that current treatments are still too expensive to be accessible to most Africans (Meslé and Vallin 2005).

As the population ages and societies pass through the health transition, the prevalence of non-communicable diseases increases. A number of developing countries in East and South-East Asia have reported more deaths caused by non-communicable diseases than by communicable diseases. New eating behaviors have caused an increase in cardiovascular diseases, diabetes, and cancer. As a result, cardiovascular diseases have begun to affect almost all of the poorest countries, where they are becoming increasingly prevalent. Research suggests that their prevalence may increase in the years ahead, thus potentially limiting socio-economic development. One major concern is the relatively young age at which people in developing countries die of these diseases compared to people in developed regions. In developing and transition countries, the extent of the changes means that excess weight and obesity now coexist with malnutrition, sometimes within the same social environment and in some cases within the same family.

Among the harmful practices associated with modernization, smoking is responsible for high mortality and morbidity rates. Mortality and disability caused by traffic accidents are also on the increase in many developing countries where the road infrastructure is inadequate and safety measures have yet to be implemented. The global context (i.e. urbanization, increased international mobility, changes in human behavior) is also becoming increasingly conducive to the emergence or resurgence of new epidemics. In the last two decades, new diseases have emerged at a rate of one per year – an unprecedented trend which, according to the WHO, seems likely to continue.

Developing countries are thus faced with a major challenge: to deal with the appearance of new diseases (‘diseases of affluence’) while continuing to fight against old diseases and illnesses that have yet to be eradicated. Developing countries are therefore affected by all types of pathologies (i.e. pathologies associated with the first stage of the health transition and chronic diseases), thus placing a double morbidity burden on the population. Meanwhile, the resources available for treating patients seem likely to decline.

The objective of 'health for all' remains, nonetheless, a realistic ambition in developing countries. However, in order to achieve this goal, much progress is still needed. The improvement of health systems will be a key factor. Health systems (based on primary health care since the declaration of Alma-Ata in 1978) are in crisis, and only 50 % of the population of developing countries has access to health care. The introduction of primary health care has been impeded by a range of factors – not least because of the cost of primary care in countries where the target population is the large majority of the population. There has also been significant resistance (if only passive) to any major redeployment of existing resources. Most governments have adopted health policies based on the primary care approach, although the implementation of these policies has been limited and has almost never resulted in the major policy overhaul required to achieve the anticipated results. In order to achieve the objectives set for 2015, an additional 1.6 billion people will need to have access to a health system. If the trend that began in the last decade continues, 600 million people will be excluded from health care services by 2015 (United Nations 2007).

The provision of high-quality health care accessible to all requires significant spending and viable funding mechanisms. While global health spending has increased significantly in the last 30 years, the increase of spending in the poorest countries remains slow and in some cases non-existent. The lack of qualified health professionals particularly affects developing countries, and yet it is precisely in these countries that the needs are most urgent. In developing countries, the lack of staff and equipment means that other issues such as the introduction of social protection systems for the poorest members of society have remained secondary priorities. Qualified health professionals from poor countries often immigrate to wealthy countries. Yet it is precisely by retaining qualified health professionals that Costa Rica, Kenya and the Indian State of Kerala (not to mention China) have been able to improve their life expectancy well beyond what might have been expected based on their level of economic development. In its 2008 report on health in the world, the WHO reaffirmed the importance of reforming health systems to ensure that they provide primary health care services. These reforms are essential for dealing with new health challenges and for meeting the demands for fairer care and better social protection.

The actions required to achieve the Millennium Development Goals will require solid and reliable indicators. Recent reports on progress in these areas have highlighted the need to increase the capacity of developing countries to collect, analyze and disseminate data. Major efforts have been made to improve access to information, to coordinate national statistical systems and to establish links with international agencies. However, the production of national data tends to be aligned with international standards and recommendations, and many poor countries have encountered major difficulties in trying to develop the capacity to produce better data.

Improvements in population health are dependent on the efficiency of health systems, but also, and perhaps more importantly, on the broader socio-economic and political context – a key factor in promoting population heath. Access to

essential drugs, but also food self-sufficiency, access to drinking water, environmental sanitation, a sanitary living environment, and health education programs all have a significant impact on health. Therefore, it is vitally important to promote and implement policies in all of these areas. Education is a major determining factor of health improvement. The education of women in particular needs to be promoted in order to improve the health care provided to children and other family members. The basic rules of hygiene – one of the key factors for the improvement of public health – are transmitted by women and in schools. The countries where child mortality is highest are those where the level of female illiteracy is highest. The education of girls and women is also key to reducing fertility, promoting contraception and (therefore) reducing maternal mortality. Education is also one of the most effective tools for preventing AIDS. More generally, health has a major impact on educational performance and outcomes.

The health of women is determined by their social and family status, and education can have significant impact on gender equality. Because of their role in the household, women, and certain categories of women in particular (widows, heads of households), are the most vulnerable. The reproductive health of poor women and girls is threatened by poor diet, household chores and poor hygiene, but also by sexual abuse and domestic violence. Therefore, measures promoting gender equality must be a central component of health policies aimed at the poorest members of society.

Diet and food security are also among the major determinants of health. The many forms of malnutrition affect growth and weaken the general state of health of an individual, their physical and intellectual capacities and their body's immune system. Malnutrition increases the risk of illness and the severity of infections, and, associated with other factors, is the cause of over half of all child deaths. As such, malnutrition and undernourishment (less than 300 cal a day) are a major obstacle to the economic and social development of a society. According to the FAO, nearly 800 million people in developing countries are affected by hunger on a permanent basis. Asia has the highest number of people affected by hunger, although the proportion of the population suffering from hunger is highest in Africa (32 %).

The quality of the environment has a direct impact on health, particularly access to drinking water and environmental sanitation. These are the most effective ways of fighting against infections transmitted by the different vectors present in areas where stagnant water is the main source of drinking water, cooking water and washing water. Where there is no improved sanitation, the beneficial effects of drinking water and personal hygiene on health remain limited. In 2008, one billion people throughout the world had no access to drinking water, while 2.6 billion people had no access to improved sanitation. In developing regions, three quarters of the population use an improved water source, although just 60 % of the population in sub-Saharan Africa has access to an improved water source. Almost half of the population (48 %) has no basic sanitation – including 69 % in sub-Saharan Africa and 64 % in South Asia. Sanitation and drinking water are not seen as priorities in national budgets and public development aid in these areas, despite the significant impact on public health. The rapid expansion of urban areas is also a major obstacle to the

improvement of slums, which are constantly growing. The United Nations estimated that over 800 million people were living in slums in 2010. Sub-Saharan Africa is one of the developing regions most affected by lack of housing for the new urban populations flowing into these areas. In Chad, the Central African Republic and Ethiopia, 80 % of the urban population live in slums.

The importance given to health is an indication of the increased awareness of the link between health and poverty in the international community. Health is at the heart of development. The WHO Commission on Macroeconomics and Health showed that a significant improvement of health is a prerequisite for development. There are many factors involved in this process (OECD 2004). Healthy workers are more productive and high labor productivity encourages investment. The improvement of the health situation has a positive impact on educational performance and outcomes, which, in the long term, contributes to broadening the base of human capital. In a healthy population, the percentage of income allocated to savings increases. Under the impact of improved health and increased levels of education, fertility declines, causing the dependency ratio to decline,[1] which in turn promotes per capita income growth in the poorest countries.

In short, improving the health of the poorest amounts to investing in growth and economic development (Marek et al. 2006). Countries will need to mobilize additional resources and to use public spending to support the most vulnerable and underprivileged populations. However, the poorest countries cannot do this alone. Developed countries must fulfill their commitment to promote health and economic development on a long-term basis and will need to act quickly to increase aid.[2] In March 2004, the executive director of the United Nations Population Fund, Thoraya Ahmed Obaid, stated that '[i]n order to meet the challenges that the world will soon have to face, it is essential to increase partnerships, not just between governments, NGOs, private sector actors and the media, but also between the North and the South and between the South and the South'.

Far from the slogan 'Health for all by 2000', recent reports on health trends in developing countries have highlighted persistent and emerging public health problems, thus raising questions about the epidemiological transition model. Much remains to be done, and more could be done if all parties fulfill their commitments. The targets can be achieved in most developing countries, including Africa. Prevention appears increasingly to be the best way to fight against communicable and non-communicable diseases. It is important to recognize that being in good health is a relative value involving a complex of factors revolving around both the individual and the collective.

The health improvements over the last century are explained by a combination of factors, including medical advances, the economic resources devoted to human development (education and health are vital), the effectiveness of health policies,

[1] Ratio of working population to non-working population.

[2] Excluding debt relief and humanitarian aid, aid to sub-Saharan Africa has remained almost at a standstill since 2004 (United Nations 2007).

the reduction of poverty, and changes in the status of women. The countries that have recognized and responded to these challenges have been largely successful in the fight against infectious diseases. The demographic situation of developing countries is still very favorable, with relatively young populations. However, these populations will eventually be faced with new public health problems (such as those affecting the old industrialized countries), including diseases of the circulatory system and cancer. Will they or can they be as effective in addressing these issues?

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Annex 1: The Millennium Development Goals (*Source: United Nations*)

At the 2000 UN Millennium Summit, world leaders from rich and poor countries alike committed themselves – at the highest political level – to a set of eight time-bound targets that, when achieved, will end extreme poverty worldwide by 2015.

Goal 1: Eradicate Extreme Poverty & Hunger

Target 1.A: Halve, between 1990 and 2015, the proportion of people whose income is less than $1 a day
Target 1.B: Achieve full and productive employment and decent work for all, including women and young people
Target 1.C: Halve, between 1990 and 2015, the proportion of people who suffer from hunger

Goal 2: Achieve Universal Primary Education

Target 2.A: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling

Goal 3: Promote Gender Equality and Empower Women

Target 3.A: Eliminate gender disparity in primary and secondary education, preferably by 2005, and in all levels of education no later than 2015

Goal 4: Reduce Child Mortality

Target 4.A: Reduce by two thirds, between 1990 and 2015, the under-five mortality rate

Goal 5: Improve Maternal Health

Target 5.A: Reduce by three quarters the maternal mortality ratio
Target 5.B: Achieve universal access to reproductive health

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Goal 6: Combat HIV/AIDS, Malaria and Other Diseases

Target 6.A: Have halted by 2015 and begun to reverse the spread of HIV/AIDS
Target 6.B: Achieve, by 2010, universal access to treatment for HIV/AIDS for all those who need it
Target 6.C: Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases

Goal 7: Ensure Environmental Sustainability

Target 7.A: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources
Target 7.B: Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss
Target 7.C: Halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation
Target 7.D: By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers

Goal 8: Develop a Global Partnership for Development

Target 8.A: Develop further an open, rule-based, predictable, non-discriminatory trading and financial system
Target 8.B: Address the special needs of least developed countries
Target 8.C: Address the special needs of landlocked developing countries and small island developing States
Target 8.D: Deal comprehensively with the debt problems of developing countries
Target 8.E: In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries
Target 8.F: In cooperation with the private sector, make available benefits of new technologies, especially information and communications

Annex 2: Who Regional and Income Grouping (*Source: WHO*)

Who Regional Groupings

WHO African Region: Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo, Cote d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, South Africa, Swaziland, Togo, Uganda, United Republic of Tanzania, Zambia, Zimbabwe.

WHO Region of the Americas: Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia (Plurinational State of), Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, United States of America, Uruguay, Venezuela (Bolivarian Republic of).

WHO South-East Asia Region: Bangladesh, Bhutan, Democratic People's Republic of Korea, India, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka, Thailand, Timor-Leste.

WHO European Region: Albania, Andorra, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Luxembourg, Malta, Monaco, Montenegro, Netherlands, Norway, Poland, Portugal, Republic of Moldova, Romania, Russian Federation, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, The former Yugoslav Republic of Macedonia, Turkey, Turkmenistan, Ukraine, United Kingdom, Uzbekistan.

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WHO Eastern Mediterranean Region: Afghanistan, Bahrain, Djibouti, Egypt, Iran (Islamic Republic of), Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Somalia, Sudan, Syrian Arab Republic, Tunisia, United Arab Emirates, Yemen.

WHO Western Pacific Region: Australia, Brunei Darussalam, Cambodia, China, Cook Islands, Fiji, Japan, Kiribati, Lao People's Democratic Republic, Malaysia, Marshall Islands, Micronesia (Federated States of), Mongolia, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Philippines, Republic of Korea, Samoa, Singapore, Solomon Islands, Tonga, Tuvalu, Vanuatu, Viet Nam.

Income Groupings

Low income: Afghanistan, Bangladesh, Benin, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Democratic People's Republic of Korea, Democratic Republic of the Congo, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Kenya, Kyrgyzstan, Liberia, Madagascar, Malawi, Mali, Mozambique, Myanmar, Nepal, Niger, Rwanda, Sierra Leone, Somalia, Tajikistan, Togo, Uganda, United Republic of Tanzania, Zimbabwe.

Lower middle income: Angola, Armenia, Belize, Bhutan, Bolivia (Plurinational State of), Cameroon, Cape Verde, Congo, Cote d'Ivoire, Djibouti, Egypt, El Salvador, Fiji, Georgia, Ghana, Guatemala, Guyana, Honduras, India, Indonesia, Iraq, Kiribati, Lao People's Democratic Republic, Lesotho, Marshall Islands, Mauritania, Micronesia (Federated States of), Mongolia, Morocco, Nicaragua, Nigeria, Pakistan, Papua New Guinea, Paraguay, Philippines, Republic of Moldova, Samoa, Sao Tome and Principe, Senegal, Solomon Islands, Sri Lanka, Sudan, Swaziland, Syrian Arab Republic, Timor-Leste, Tonga, Turkmenistan, Tuvalu, Ukraine, Uzbekistan, Vanuatu, Viet Nam, Yemen, Zambia.

Upper middle income: Albania, Algeria, Antigua and Barbuda, Argentina, Azerbaijan, Belarus, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Chile, China, Colombia, Cook Islands, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, Gabon, Grenada, Iran (Islamic Republic of), Jamaica, Jordan, Kazakhstan, Latvia, Lebanon, Libya, Lithuania, Malaysia, Maldives, Mauritius, Mexico, Montenegro, Namibia, Nauru, Niue, Palau, Panama, Peru, Romania, Russian Federation, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Serbia, Seychelles, South Africa, Suriname, Thailand, The former Yugoslav Republic of Macedonia, Tunisia, Turkey, Uruguay, Venezuela (Bolivarian Republic of).

High income: Andorra, Australia, Austria, Bahamas, Bahrain, Barbados, Belgium, Brunei Darussalam, Canada, Croatia, Cyprus, Czech Republic, Denmark, Equatorial Guinea, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Kuwait, Luxembourg, Malta, Monaco, Netherlands, New Zealand, Norway, Oman, Poland, Portugal, Qatar, Republic of Korea, San Marino, Saudi Arabia, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, Trinidad and Tobago, United Arab Emirates, United Kingdom, United States of America.

Annex 3: Declaration of Alma-Ata in 1978 (*Source: WHO*)

The International Conference on Primary Health Care, meeting in Alma-Ata this 12th day of September in the year 1978, expressing the need for urgent action by all governments, all health and development workers, and the world community to protect and promote the health of all the people of the world, hereby makes the following Declaration:

I

The Conference strongly reaffirms that health, which is a state of complete physical, mental and social wellbeing, and not merely the absence of disease or infirmity, is a fundamental human right and that the attainment of the highest possible level of health is a most important world-wide social goal whose realization requires the action of many other social and economic sectors in addition to the health sector.

II

The existing gross inequality in the health status of the people particularly between developed and developing countries as well as within countries is politically, socially and economically unacceptable and is, therefore, of common concern to all countries.

III

Economic and social development, based on a New International Economic Order, is of basic importance to the fullest attainment of health for all and to the reduction of the gap between the health status of the developing and developed countries.

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The promotion and protection of the health of the people is essential to sustained economic and social development and contributes to a better quality of life and to world peace.

IV

The people have the right and duty to participate individually and collectively in the planning and implementation of their health care.

V

Governments have a responsibility for the health of their people which can be fulfilled only by the provision of adequate health and social measures. A main social target of governments, international organizations and the whole world community in the coming decades should be the attainment by all peoples of the world by the year 2000 of a level of health that will permit them to lead a socially and economically productive life. Primary health care is the key to attaining this target as part of development in the spirit of social justice.

VI

Primary health care is essential health care based on practical, scientifically sound and socially acceptable methods and technology made universally accessible to individuals and families in the community through their full participation and at a cost that the community and country can afford to maintain at every stage of their development in the spirit of self-reliance and self-determination. It forms an integral part both of the country's health system, of which it is the central function and main focus, and of the overall social and economic development of the community. It is the first level of contact of individuals, the family and community with the national health system bringing health care as close as possible to where people live and work, and constitutes the first element of a continuing health care process.

VII

Primary health care:

1. reflects and evolves from the economic conditions and sociocultural and political characteristics of the country and its communities and is based on the application of the relevant results of social, biomedical and health services research and public health experience;

2. addresses the main health problems in the community, providing promotive, preventive, curative and rehabilitative services accordingly;
3. includes at least: education concerning prevailing health problems and the methods of preventing and controlling them; promotion of food supply and proper nutrition; an adequate supply of safe water and basic sanitation; maternal and child health care, including family planning; immunization against the major infectious diseases; prevention and control of locally endemic diseases; appropriate treatment of common diseases and injuries; and provision of essential drugs;
4. involves, in addition to the health sector, all related sectors and aspects of national and community development, in particular agriculture, animal husbandry, food, industry, education, housing, public works, communications and other sectors; and demands the coordinated efforts of all those sectors;
5. requires and promotes maximum community and individual self-reliance and participation in the planning, organization, operation and control of primary health care, making fullest use of local, national and other available resources; and to this end develops through appropriate education the ability of communities to participate;
6. should be sustained by integrated, functional and mutually supportive referral systems, leading to the progressive improvement of comprehensive health care for all, and giving priority to those most in need;
7. relies, at local and referral levels, on health workers, including physicians, nurses, midwives, auxiliaries and community workers as applicable, as well as traditional practitioners as needed, suitably trained socially and technically to work as a health team and to respond to the expressed health needs of the community.

VIII

All governments should formulate national policies, strategies and plans of action to launch and sustain primary health care as part of a comprehensive national health system and in coordination with other sectors. To this end, it will be necessary to exercise political will, to mobilize the country's resources and to use available external resources rationally.

IX

All countries should cooperate in a spirit of partnership and service to ensure primary health care for all people since the attainment of health by people in any one country directly concerns and benefits every other country. In this context the joint WHO/UNICEF report on primary health care constitutes a solid basis for the further development and operation of primary health care throughout the world.

X

An acceptable level of health for all the people of the world by the year 2000 can be attained through a fuller and better use of the world's resources, a considerable part of which is now spent on armaments and military conflicts. A genuine policy of independence, peace, détente and disarmament could and should release additional resources that could well be devoted to peaceful aims and in particular to the acceleration of social and economic development of which primary health care, as an essential part, should be allotted its proper share.

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