

PARITIES AND DISPARITIES IN ATTAINING GLOBAL HEALTH: THE WAY FORWARD FOR DEVELOPING COUNTRIES

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Abstract

The 20th Century witnessed a revolution in human health and well being. Average life expectancy at birth in many industrialized countries nearly doubled from around 45 years in 1900 to more than 70 years in 1999 (UN, 1976). Less developed countries also enjoyed dramatic, albeit less extensive, improvements in living standards and declines in mortality. However, as some health threats have receded, others have emerged. Some disease causing microbes have become resistant to medicines commonly used to treat them. Aspects of modern life appear to encourage unhealthy behavior, such as smoking, high fat diets and risky sexual practices. And, there is substantial gap in mortality and disability among and within countries. A growing recognition of this disparity prompted the World Health Organization to mount an international effort to attain "health for all" (WHO, 2000). This paper looks at trends in health over the past century and identifies the ways that nations could adopt to pursue the goal of better global health. It explores the multiple factors that determine health, stressing the need for action from the individual to the international level to improve health.

Introduction

The 20th Century witnessed a revolution in human health and well-being. Average life expectancy at birth in many industrialized countries nearly doubled from around 45 years in 1900 to more than 70 years in 1999 (UN, 1976). Less developed countries also enjoyed dramatic, albeit less extensive, improvements in living standards and declines in mortality. The sweeping improvements in health and success at controlling such ancient human foes as small pox and cholera created expectations that everyone could attain good health. However, as some health threats have receded, others have emerged. Some disease causing microbes have become resistant to medicines commonly used to treat them. Aspects of modern life appear to encourage unhealthy behavior, such as smoking, high fat diets and risky sexual practices. And, there is substantial gap in mortality and disability among and within countries. A growing recognition of this disparity prompted the World Health Organization to mount an international effort to attain "health for all" (WHO, 2000). Whether the developing world can attain good health in the 21st Century remains the big question.

The 20th century declines in mortality rates and increases in life expectancy in much of the world were unprecedented in human history (Ratzan *et al*, 2000). These trends precipitated a massive increase in population size and altered the regional distribution of world population. The population age structure changed to include larger percentages of elderly people. These remarkable improvements in health have been described as a broader health transition that is spurred by elements of economic development, including urbanization, rising incomes and educational levels, and the expanded health systems.

Researchers define the health transition using various models, but it is commonly described as encompassing the demographic transition from high to low fertility and mortality rates, and the epidemiologic or mortality transition in which the predominant causes of death shift from communicable diseases (Jamison, 1993).

Further, health transition signals 'a shift in the ways that individuals and communities perceive and respond to their own health and ill health' (Cleland and Hill: 1 {n.d}). As such, it emphasizes the role of social and economic influences on health. Countries may stagnate or regress in the trend toward lower mortality and fertility, for example, as when mortality rates increased in Russia after the breakup of the Soviet Union. Life expectancy at birth for Russian men lost more than seven years between 1987 and 1994 (Bobadilla *et al*, 1997). This unusual decline was attributed to increased adult mortality related to social and economic stress generated by the transition from a communist to capitalist economy, and the deterioration in Russia's health care services. While Russia's life expectancy improved in the late 1990s, it is still among the lowest in the more developed world. In the late 1990s, life expectancy for Russian males was 61 years compared with 74 years for U.S. males. The transitions do not necessarily occur smoothly, and they may not have an endpoint. Some researchers, for example Olshansky *et al* (1997) suggest that the world maybe entering a new stage of mortality transition, in which infectious diseases are re-emerging as major health problems.

Mortality is most often used to assess a population's health status and to compare the status of different populations. Almost every country records deaths and publishes death rates with various levels of detail, coverage, and accuracy. Death rates may show the age, sex, and ethnicity of the person who died, and probable cause of death. In countries with high mortality rates, illness may rapidly progress to death, and cause-specific mortality rates may provide a meaningful snapshot of the population's health. In low-mortality countries, however, death is often the terminal event after long series of increasingly debilitating diseases. Also, many people live with chronic health problems that never lead to death but prevent them from having healthy children or from fully participating in working and family lives.

Therefore in such a country, morbidity provides a clearer picture of a population's health. Relatively little comparable information on the incidence and prevalence of disease and disability is available on the national level, especially in less developed countries. But the body of data is expanding through international efforts to standardize vital statistics and hospital records, and through household surveys about health status, knowledge, and behavior. Since the 1980s, for example, demographic and health surveys conducted in more than 50 less developed countries provide comparable data on infant feeding practices, use of family planning, childhood immunization, and other maternal and child health indicators (Rockett, 1999).

In another major effort to produce comparable international measures of health, researchers at the World Bank, WHO, and Harvard University have created a new way to assess and compare the health of populations: the disability-adjusted life year (DALY). DALYs are quantitative indicators derived to reflect the number of years of healthy life lost to all causes, whether from premature mortality or from temporary or permanent disability, which can be physical or mental.

The DALY was designed to assist in setting health service priorities; identifying disadvantaged groups and targeting health interventions; and providing comparable measures for planning and evaluating programs. The number of DALYs estimated at any moment reflect the amount of health care already being provided to the population, as well as the effects of all other actions that protect or damage health.

Where treatment (preventive, curative, or palliative) is possible, the effectiveness of the intervention is the reduction in the disease burden that the treatment produces. Effectiveness is measured in the same units (DALYs) as disease burden, and can be compared across interventions that treat different problems and produce different outcomes. In other words, the DALY can be used to measure the gains in health attributable to different factors or health interventions. There are a number of other indicators used to assess health. One is the quality-adjusted life year (QALY), which is commonly used to measure the cost-effectiveness of health interventions. According to Stratton *et al* (1999), the QALY estimates the number of years of life added by a successful treatment adjusted for the quality of life (as affected by any lingering disability from the health problem).

Nonetheless, one obstacle to measuring health is that health may be defined differently in one population than in another depending on demographic variables, the socioeconomic setting, beliefs and cultural factors, medical resources, etc. In high mortality African villages, for instance, deaths among infants and young children occur ten times more frequently than among the elderly. The preponderance of childhood deaths reflects the large proportion of children in these high fertility populations as well as high incidence of infectious diseases. In low fertility, low-

mortality settings such as the USA, infant and child deaths have become extremely rare relative to adult deaths (National Center for Health Statistics [NCHS, 1999]). Thus, an infant mortality rate of 50 deaths per 1,000 births in Sub-Saharan African village would signal a welcome improvement in infant health, while the same rate would mean a significant deterioration in health for a U.S city.

Parities and Disparities in Health Transition between the Developed and Developing Countries

Finding No.1 Demographic transition

The demographic transition describes the shift from high fertility and mortality common in less developed countries to the low fertility and mortality rates typical of modern industrialized countries. Mortality usually falls first, followed by fertility, but the timings and pace of change follow different patterns throughout the world (Omran *et al*, 1993). The most dramatic improvements in life expectancy for the more developed countries occurred in the first half of the 20th century. In some countries, the 19th century mortality decline trends have continued to date. Life expectancy at birth for American females was 48.3 years in 1900, jumped to 72.0 years by 1950 to 1955, but increased by relatively few years in the last half of the century to reach 79.2 by 1997 (Figure 1). Japanese females, who have the world's longest life expectancy (83.8 years in 1997), also enjoyed greater gains in average life expectancy in the first half of the century than in the second half. The United Nations estimates the average female life expectancy in more developed countries was about 65 years in the 1950s and rose to 75 years in the 1995 to 2000 period.

While most regions of the world experienced an improvement in survival in the first half of the 20th century, mortality did not decline substantially in many less developed regions until after 1950. In Africa, life expectancy rose from about 38 years in the 1950s to 51 years in the late 1990s. In Latin America, average life expectancy at birth was already 51 years in the 1950s and had climbed to 69 years by the late 1990s (Figure 2).

The mortality declines of the 20th century set off an unprecedented increase in population size. World population surged from 1.6 billion to 6.1 billion between 1900 and 2000. For most of human history, population grew slowly because the high birth rates were matched by high death rates. But as mortality fell, the population numbers began to swell from the excess of births over deaths. This demographic transition had already begun in the United States and many European countries by the beginning of the 20th century.

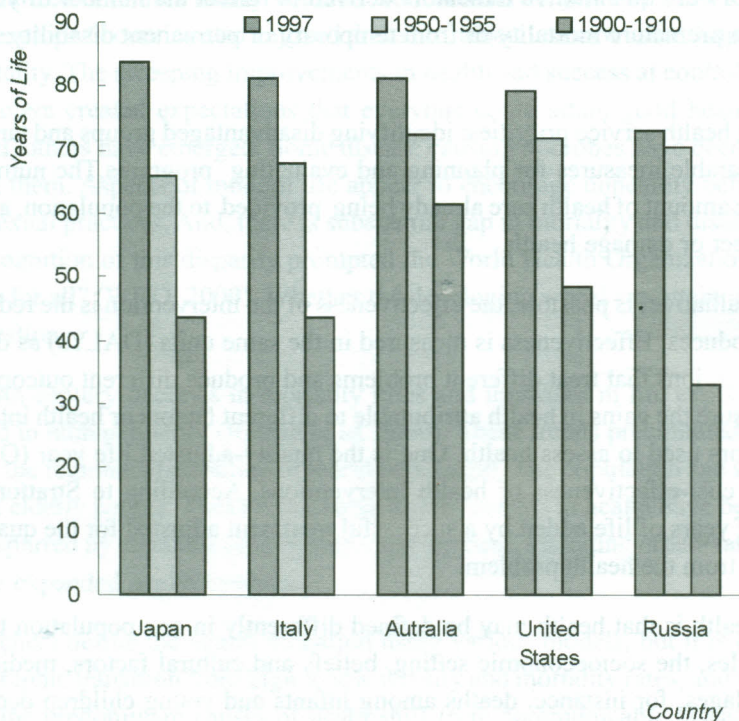


Figure .1 Increase in Female Life Expectancy at Birth, Selected Developed Countries 1900- 1997a Based on Lopez (1999)

Population growth in Europe helped fuel the transatlantic migration to the United States in the 19th and early 20th centuries. But fertility rates began to fall after the 1920s in more developed countries and population growth slowed.

In the United States, women had about four children, on average, in 1900. The total fertility rate, or the average total number of births a woman will have, fell below 3.0 children per woman by the 1930s before rising temporarily during the baby boom of the 1950s and early 1960s. From 1972 to 1977, the published total fertility rate for American women was 2.1 or less (Ryder, 1999). Fertility fell further in much of Europe over the last century. In 1999, the total fertility rate was just 1.5 in Western Europe and 1.3 in Eastern and Southern Europe.

Europe's population increased from about 408 million in 1900 to 547 million in 1950 and to 728 million in 1999. In the 21st century, continued low fertility will bring many of these countries to a new phase of demographic transition –population declines –as deaths begin to outnumber births.

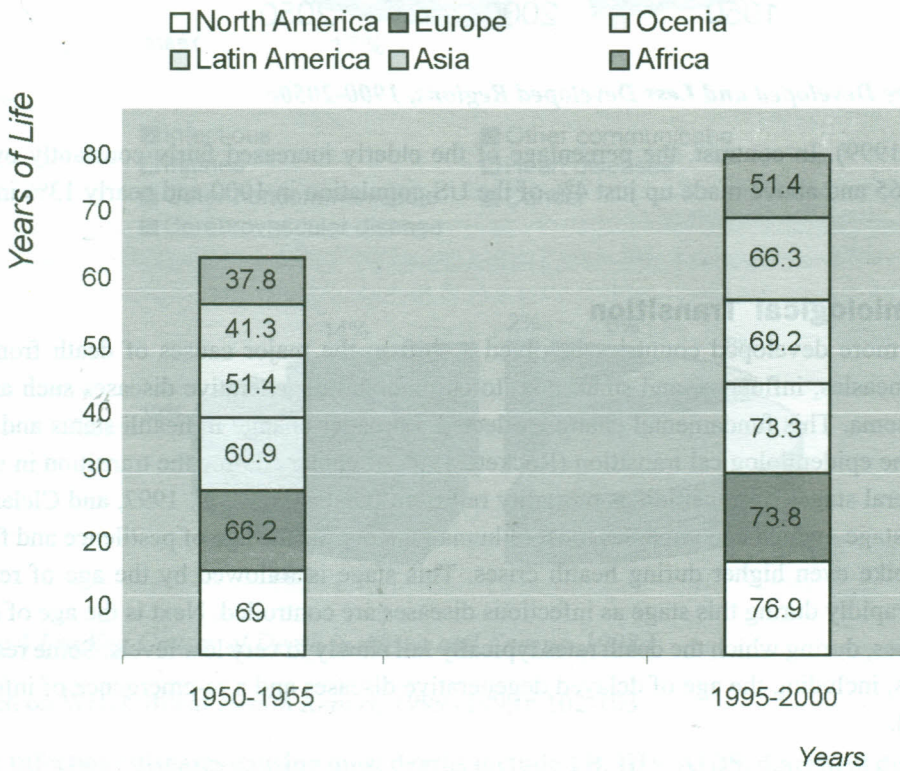


Figure 2. Life Expectancy in Major World Regions, 1950-1955 and 1995-2000b

bBased on United Nations (1998).

Several European countries, including Germany, Italy, and Russia, already had natural decrease in 1999 because of an excess of deaths over births (Haub and Cornelius, 1999). The fertility patterns were very different in the less developed countries. The average total fertility rate in these countries was nearly 6.0 until the 1970s. In Sub Saharan Africa, it was 6.5 or higher until the late 1980s. Because this extremely high fertility was accompanied by declining mortality rates, the combined populations of Africa, Latin America, and Asia (less Japan) rose from 1.1 billion in 1900 to 1.7 billion by 1950, and then nearly tripled to 4.9 billion between 1950 and 2000 (Figure 3). This rapid population growth, along with slower growth in the more developed countries, increased the less developed countries' share of world population from about 67% in 1900 to 80% in 2000. The demographic changes altered the age structure of populations. Decades of declining fertility in the more developed world reduced the relative number of children in these populations. For instance, youths aged 15 and younger made up about 34% of the US population in 1900, but just 22% by 1997 (US Bureau of the Census, 1999).

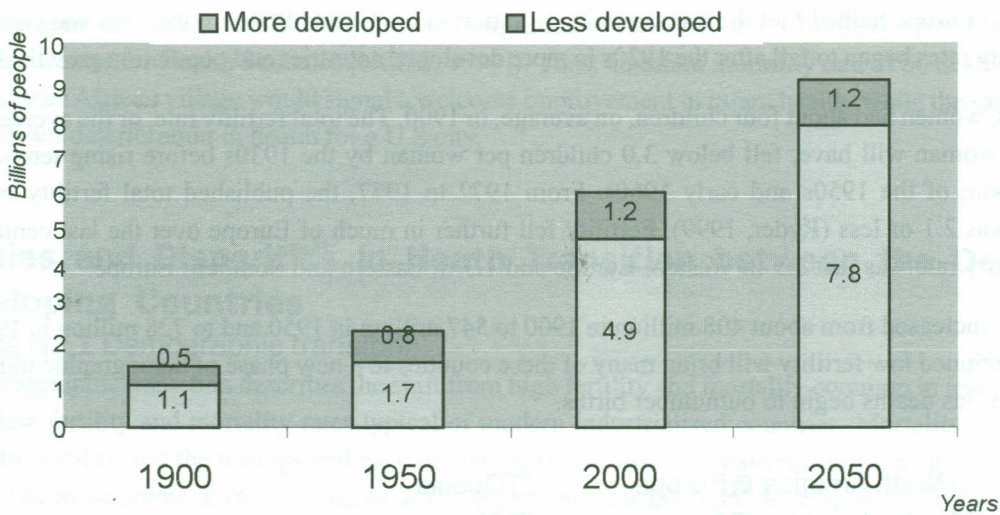


Figure 3. Population in More Developed and Less Developed Regions, 1900-2050^c

^cBased on Gelbard, *et al.* (1999). In contrast, the percentage of the elderly increased fairly constantly over the century. Persons aged from 65 and above made up just 4% of the US population in 1900 and nearly 13% in 1997.

Finding No. 2 Epidemiological Transition

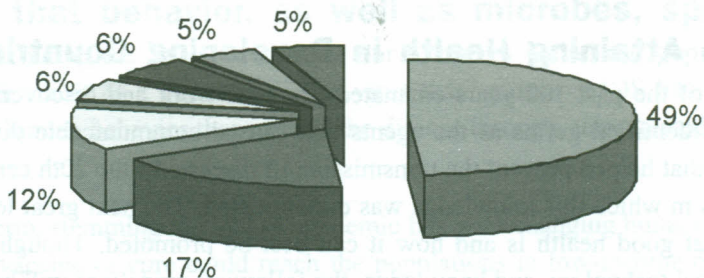
The mortality transition in more developed countries involved a shift in the major causes of death from such communicable diseases as measles, influenza, and small pox, to chronic and degenerative diseases such as heart disease, cancer, and emphysema. This fundamental change reflected a broader change in health status and health threats that is described as the epidemiological transition (Rockett, 1999). Scholars define the transition in various ways, but most identify several stages of transition as mortality rates fall (Olshansky *et al.*, 1997, and Cleland and Hill, n.d). The pretransition stage—which encompasses most of human history—is the age of pestilence and famine. Death rates are high, but spike even higher during health crises. This stage is followed by the age of receding pandemics. Death rates fall rapidly during this stage as infectious diseases are controlled. Next is the age of degenerative and man-made diseases, during which the death rates typically fall slowly to very low levels. Some researchers identify additional stages, including the age of delayed degenerative diseases and a re-emergence of infectious disease (such as HIV/AIDS).

Countries around the world occupy different stages in this transition. In Europe, for example, the major causes of death in the 1990s were heart disease, cancer, and cerebrovascular disease (strokes). Communicable diseases accounted for less than 10% of deaths (Figure 4). In contrast, infectious and parasitic diseases such as HIV/AIDS, measles, and malaria caused more than 60% of the deaths in Africa. One reason that noncommunicable diseases such as cancer and heart diseases cause a smaller percentage of deaths in areas in the early stages of transition is that a smaller proportion of the population is in the older ages, where the risk of death from these degenerative diseases is greatest. Just 3% of Africans were age 65 or older in the late 1990s, while 14% of Europeans were aged 65 or older. This difference in age structure primarily reflects the higher fertility in Africa than in Europe.

The estimated total fertility rate was 5.4 children per woman in Africa in 1999, compared with 1.4 children per woman in Europe. Africa's lower average life expectancy (about 52 years in 1999, while it was 73 years in Europe) also helps explain why degenerative diseases are not as prevalent there as they are in Europe (a smaller percentage of Africans live long enough to develop these diseases). The mortality transition also brings a shift in ages when most deaths occur. In countries at the beginning of the transition, most deaths occur in the youngest age groups because the health of babies and young children can deteriorate quickly from infectious diseases. In 1995, more than one-half of the deaths in less developed countries occurred among those under age 20; 40% of deaths were among the elderly population (ages 65 or older). In more developed countries, only about 2% of all deaths occurred among those under age 20 in 1995; 68% were among the elderly (WHO, 1998).

Africa

- Infectious diseases
- Other communicable diseases
- Other noncommunicable diseases
- Cardiovascular disease
- Injuries
- Heart diseases
- Cancer



Europe

- Infectious
- Injuries
- Other noncommunicable
- Cerebrovascular disease
- Other communicable
- Heart diseases
- Cancer

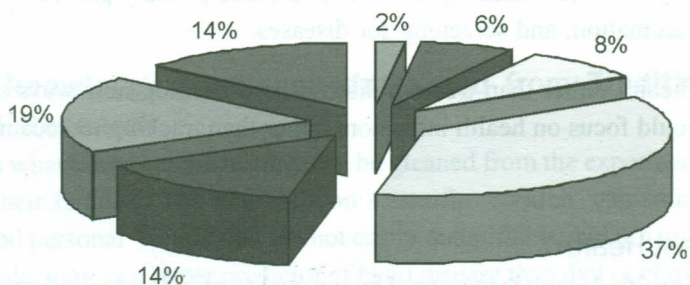


Figure 4 *Leading Causes of Death in Africa and Europe, 1998d*

dBased on WHO, *World Health Report, 1999* (1999): 102-103

Note: Infectious diseases causing most deaths include TB, HIV/AIDS, diarrheal diseases, malaria, and measles and other childhood diseases. Other communicable diseases include such diseases as pneumonia, bronchitis, and other lower respiratory diseases. Other noncommunicable diseases include such diseases as diabetes, mental disorders, chronic lung diseases, and cirrhosis of the liver. Injuries include intentional as well as unintentional injuries.

How Can the Developing World Attain Health for All?

The search for ways to improve the health of the world's growing population must be rooted in a firm understanding of what determines health. In the last half of the 20th century, the concept of health has been transformed from a simple interaction between microbes and the body to a complex, multifaceted process. A better understanding of the determinants of health can guide the type of interventions appropriate to attain or maintain health. At the most basic level, the "practice of good health" at the individual or community level involves acting on the following questions: how do we keep ourselves well? (Primary prevention); If we are getting sick, how can we detect these conditions early? (Secondary prevention); If we are sick, how do we get the best care? (Tertiary prevention).

These questions outline the classic public health view of disease prevention. Primary prevention typically involves the interruption of transmission of infectious disease agents or exposure to environmental health hazards in the population through education. It also encompasses behavior modification, immunizations, and environmental measures. Practicing 'safe sex' to prevent HIV transmission, enforcing automobile emissions standards, adding

fluoride to water, and vaccination campaigns are examples of primary prevention. Secondary prevention is the interruption of clinical disease after exposure to an infectious agent or environmental hazard. In the case of HIV, secondary prevention entails preventing or delaying the onset of AIDS by using drugs and other medical, nutritional, and psychological measures. Tertiary prevention usually involves the prevention of complications of the health problem after it occurs (Khoury, 1996).

The Way Forward In Attaining Health in Developing Countries

Many of the health successes of the past 100 years emanated from the work and discoveries of Louis Pasteur, Robert Koch, and others who identified germs as the agents that caused communicable diseases. Joseph Lister introduced antiseptic practices that helped prevent the transmission of disease. In the 20th century, life expectancy nearly doubled in the countries in which this knowledge was disseminated. The next great leaps in health will be based on new ideas about what good health is and how it can best be promoted. Though the future promises exciting developments in medical technology and knowledge, the following guidelines will be critical in attaining health.

Pursue Health, Not Just Cures for Disease

By emphasizing primary prevention, individuals and communities can avoid health conditions that would require treatment or cause loss of productivity. An ideal health system would include primary prevention by incorporating better communication, education, vaccination, and screening for diseases.

Another way to focus on attaining health rather than treating disease is to develop new ways to measure health. International surveillance systems could focus on health indicators rather than tracking the occurrence of diseases.

Strive For Ideal Health, Not 'Best Health'

We need to broaden the definition of health. Health is measured by the quality of individual's lives rather than simply by the absence of disease. The health of an individual or population is best assessed within the relevant socioeconomic and environmental setting. The goal for the future should be ideal physical and mental health- ideal for a specific community, ideal for given socioeconomic conditions.

Ideal health requires a basic set of values and services; it is not equivalent to 'free' health for all or 'longest life' for all. The surest way to attain ideal health is to focus on actions that will have the greatest impact: increase economic development; reduce poverty; educate the public; deter poor individual health habits (such as smoking and unprotected sex); provide basic housing and clean water; and build an effective health sector.

Reduce Economic and Social Disparities

Reducing poverty is one of the toughest challenges of the new century, but it would bring the largest rewards. Globalization has created new opportunities for economic growth and spread of wealth to new populations in the less developed world. But in some cases it has widened the income gaps between the lowest, middle, and highest income countries (UNDP, 1999). Governments at all levels must try to eliminate the disparities among and within population groups so that all people have an adequate standard of living, basic education, and equal access to health information and services. One successful model for achieving this goal is the WHO Healthy Cities Project, which has reduced poverty in more than 1,000 cities in 27 countries since 1987. The Healthy Cities approach could be transferred to other population groups: villages, towns, and even "virtual communities" created through the Internet.

Rapid population growth often hinders poverty reduction in low-income countries. High fertility creates a large dependent child population that requires costly educational, social, and health services. In some African countries, food production has not kept pace with population growth and countries are forced to spend scarce resources importing food. Population pressure and poverty can lead rural populations to waste and destroy natural resources

—by over cutting woodland and over planting cropland, for example —which can contribute to environmental, economic, and, eventually, health problems. Extreme poverty, especially in areas with marginal agricultural land, encourages migration to cities, which can compound the health burden in urban areas (Livernash and Rodenburg, 1998). Slowing population growth in the low-income countries can help reduce poverty.

Acknowledge that behavior, as well as microbes, spreads disease

Human behavior, including the way we allocate our resources within our population and among institutions, determines the health status of a population. The virus that causes AIDS has assumed epidemic proportions primarily because of human behavior that spreads the disease through unprotected sex and use of contaminated needles.

At last in the short-term, stemming the AIDS epidemic lies with changing human behavior, not medical research. It is unlikely that a vaccine or cure could reach the populations in low-income countries, which are those most affected by HIV/AIDS. Health policies need to look beyond the causes of specific diseases and strengthen the health sector by mobilizing resources from international, private, national, or other sources. These resources can enhance the delivery and management of health services and can thwart the spread of disease by focusing on primary prevention. Another promising approach to primary prevention involves developing indicators for the physical, occupational, intellectual, and emotional factors (or POISE factors) that determine health. These POISE indicators would help in designing policies for specific populations (Ratzan, 1999).

Seek Health knowledge from Individuals and from Traditional Cultures, Not just from Medical Research

Knowledge about what keeps people healthy can be gleaned from the experiences of people in their villages, towns, cities, and with their families. The emphasis on scientific research can cause medical analysts to miss cultural, environmental, and personal factors that are not easily quantifiable, but are important to health. Exposure to a virus at birth, for example, may be a better predictor of heart disease than diet or cholesterol, but this information may not surface in a typical research situation. Traditional and non western healing practices can also reveal important links between disease and behavior and introduce effective treatments not found in western familiar medicine.

Empower Individuals through Health Literacy

The purpose of education, as described by Alfred North Whitehead, is “to provide life and wisdom to the information learned” (Whitehead, 1929). Health literacy embodies the ideals of education and health. It is the capacity of individuals to obtain, interpret, and understand basic health information and services necessary for appropriate health decision-making. People might be more diligent about hand washing, for example, if they truly understand its role in preventing infectious disease. Health literacy may involve developing the skills to care for others or to teach healthy behavior to other family members. Adult children caring for elderly parents may need to learn to monitor insulin levels or blood pressure, and they will also need to learn to navigate the health system to obtain appropriate care.

Mothers of young children impart a wealth of health-related knowledge by example as well as through instruction. Personal hygiene, good nutrition, attitudes toward family planning—including safe sex practices—are all learned (or could be learned) within the family. In addition, people develop a sense for which kinds of health problems require medical care based on their parent’s actions and attitudes.

Children also learn where to go to get information about health matters. As parents become better informed about healthy behaviors, their children will develop greater health literacy. Health literacy not only arms individuals to enhance their own health and the health of family members, it also empowers them to advocate for health-friendly environment with appropriate services and preventive care.

Make Health a Global and Multicultural Issue

British scientist Sir Geoffrey Vickers suggested we need to stimulate the 'world of the well' to mobilize private and public organizations to create living and working conditions and public attitudes that support health and well being (Vickers, 1983). WHO, the World Bank, UNICEF, and a number of non-governmental organizations (NGOs) as well as the for-profit multi-national pharmaceutical industry are the principal actors involved in the delivery of health services.

Economic, social, environmental, and genetic factors are as important as health services in affecting health. Multi-national and non-governmental organizations promote health on many fronts: education, immunization campaigns, research and analysis, and policy formation. WHO, for example, is supporting a treaty that would standardize the marketing, production, and promotion of tobacco to limit the health hazards related to tobacco use. This is a promising first step toward reforming health as a global issue that people can influence through collective and individual actions.

Other multinational groups are also taking actions that affect health. The European Union is developing a directorate in health and consumer safety for its 18 member states. Such a unit might deal with economic and cultural considerations of genetically modified foods, hormone-treated beef, pharmaceuticals, and other issues.

Health can be integrated into the activities and agreements of the growing number of organizations that govern trade. The World Trade Organization, and the World Intellectual Property Organization can promote the development of health delivery, provision of medicine and foodstuffs, advancement of health literacy in communications and management, and sanctions against the marketing of illegal drugs and other health hazards. NAFTA (the North American Free Trade Agreement), APEC (Asian Pacific Economic Cooperation), ASEAN (Association of Southeast Asian Nations), other international trade organizations, and the Andean Community could also put health on their agendas.

NGOs are also becoming important actors in the efforts to attain global health. In addition to administering their own programs, NGOs should influence the policy agenda at international conferences and in national legislation. Public and private organizations and national governments on the other hand need to work together to advance global health. The most obvious areas that would benefit from co-operative effort are health service delivery and policies concerning treatment of diseases. World surveillance systems are another prime opportunity for international cooperation. Other potential for cooperation include the integration of activities that affect social, economic and environmental factors important for health. Many international organizations support activities crucial to these other factors that determine health.

The ILO and UNEP, for example, provide guidance on safe levels of chemicals in drinking water, pesticides, food additives, and in livestock feed. The media can also promulgate health and equity by promoting civic responsibility, global citizenship, and environmental stewardship.

Implement and Enforce Policies that Strengthen Health Systems and Encourage Health Literacy

While the WHO represents the interests of 191 member states in setting policies, it is up to each individual country to adopt and implement its policies, and many policies have not been implemented. For example, TB kills more young people and children than any infectious disease in the world today more than malaria and HIV/AIDS combined. Yet TB treatment usually does not follow the best scientific study. The DOTS strategy can detect and cure 95% of TB patients. As of 1999, however, WHO reports that only 102 of the 212 countries and territories in the world had adopted the DOTS strategy to control TB. Environmental exposure is another policy challenge. In the workplace, over 500 million people annually suffer injury and occupational and respiratory diseases.

Many of these health problems could be prevented by policies that enforce health and safety standards for employers and employees. The creation and implementation of effective policies could include promoting public-private partnerships. Combining resources of soap manufacturers with governmental hand washing campaigns can for instance decrease the spread of disease, just as pesticide manufactures can work with health workers on malaria eradication.

It could also include adopting best practice guidelines and incentives to adopt and evaluate health policies; encouraging policy change at the local level to create healthier environments; supporting global conventions that address health threats, such as global convention on tobacco and creating global surveillance systems and health indicators that reward reporting of disease and health. Other measures should involve linking economic policy and development with the goal of improving health and developing ethical standards and moral leadership for media conglomerates

Harness the Information Revolution to Improve Health Systems

New technologies are making health information available faster than it can be absorbed by health systems. Health care systems need help to capitalize on the wealth of information and new means of communication. Governments may not be the most efficient distributors of information. Global corporations have surpassed national governments in resources. In particular, they have the ability to reach millions of people through their products and their business operations. Corporations can use their considerable power to further social good—like good health—and thus be at the forefront of a revolution in health made possible through effective health communication. National governments and international organizations can provide incentives for corporations to use their power to promote general health.

New technologies and research promise exciting developments at all levels of health intervention. Passive public health delivery systems might include such primary prevention interventions as smart airbags for automobiles; food fortified with micronutrients, new vaccines for endemic regions, and fluoridated water.

More active interventions are being redeveloped for cancer: chemotherapy to prevent cancer, earlier detection and treatment, cancer vaccines, and cancer-fighting viruses and antibodies. Biotechnologists are also developing new foods with potential health benefits.

Cholesterol-busting margarine, cow's milk containing vaccines or medicines (in a process called "pharming") and genetically altered, vitamin A-enriched rice offer passive delivery of public health interventions. Primary prevention can also help control genetic diseases. New indices and measures can be developed to capitalize on new technologies and allow individuals to take a more active role in their health. Data on an individual's blood pressure, body mass index, cholesterol, and other indices might be used by future public health interventions. The development of comprehensive global health indicators could also help focus society on prevention. Ideally, health indicators could be established by credible international organizations (such as WHO), could receive publicity in the news media, and could be adapted locally so that every citizen could compare their individual and community health.

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