

Chapter 2

HEALTH CONDITIONS AND TRENDS

In recent years, the demographic situation in the Americas continues to be characterized by a transition caused by low fertility and decreasing mortality rates. As a result, the population overall is aging and the “demographic dependence” of the young (0–14 years of age) and the old (64 years of age and older) on the potentially active (working) population (15–63 years of age) is decreasing. Regional, subregional, and national averages, however, mask persistent inequitable situations at various geographic and social levels and among certain population groups. Furthermore, migration within and between countries affects the distribution of the population and impacts the delivery of health services.

In the last quarter-century, life expectancy in the Americas has increased by 7 years, with the average age today over 70. The aging of the population varies greatly among countries of the Americas: aging is a significant phenomenon in Barbados, Cuba, Puerto Rico, and Uruguay; while in Bolivia, Haiti, Guatemala, Honduras, and Nicaragua the population is generally younger.

The mortality profile in the Americas has changed significantly over the past several decades. In almost every country, communicable diseases have been replaced as the principal causes of illness and death by chronic, degenerative diseases—circulatory system diseases, malignant neoplasms, chronic respiratory diseases, and diabetes—and by external causes such as traffic accidents and homicides. Among the factors contributing to this changed profile are the aging of the population, the control and reduction of a number of communicable diseases, and the appearance of new ones such as HIV/AIDS. Significant differences in mortality exist, however, among countries and subregions of the Americas.

Countries of the Americas have led the way in vaccine-preventable disease eradication (smallpox and poliomyelitis), elimination (endemic transmission of measles), and control (pertussis, diphtheria, tetanus, invasive diseases caused by *Haemophilus influenzae* type b, and hepatitis B). These achievements have been secured by attaining and maintaining high levels of immunization coverage, implementing effective surveillance, and conducting mass immunization campaigns. In 2003 the countries committed to eliminating

rubella and congenital rubella syndrome by 2010. Using immunization to its full potential is critical to attaining mortality reduction and health development targets, which implies new challenges in immunization that extend to influenza, rotavirus, pneumococcus, and human papilloma virus.

Vector-borne diseases—especially malaria, dengue, and Chagas’—continue to compromise the health of a large proportion of the regional population. While the number of reported cases of malaria hit a peak in the late 1990s, the disease is still endemic in 21 countries and results in approximately one million cases reported annually—a significant economic impact, as two-thirds of those cases occur in working-age people. The incidence and epidemics of dengue have increased worldwide over the past 35 years; from 2001 to 2005, more than 30 countries in the Americas reported almost three million cases of dengue and dengue hemorrhagic fever. Chagas’ disease, endemic in 21 countries of the Americas, is currently estimated to infect some 18 million people, primarily the poor in rural areas.

Zoonoses—diseases in animals that can be transmitted to humans—represent two-thirds of pathogenic species affecting humans and three-fourths of emerging pathogens. Given the serious threat they pose to public health and economic development, the countries of the Region vigorously pursue prevention and control programs to combat such zoonoses as plague, rabies, leishmaniasis, hydatidosis, brucellosis, and bovine tuberculosis.

At year-end 2005, an estimated 3.2 million people in the Americas were infected with HIV—60% of whom resided in Latin America and the Caribbean. Moreover, incidence of the disease is on the rise in the Region, with 220,000 new cases reported in 2005. Of the 10 regions with the highest HIV prevalence worldwide, the Caribbean ranks second, and, while the disease is concentrated in certain populations in the rest of the Region, in the Caribbean it is generalized throughout the population. The groups most affected by HIV are men who have sex with men, sex workers, and those who inject drugs. An estimated 50 million new cases of sexually transmitted infections (STIs) occur every year in the Americas.

Noncommunicable chronic diseases—cardiovascular diseases, cancer, diabetes, and chronic pulmonary obstructive diseases—cause two of every three deaths in the general population of Latin America and the Caribbean and almost half of all deaths in the under-70-year age group. In addition to leading to premature deaths, these diseases cause complications and disabilities, limit productivity, and require costly treatments. Together with genetic disposition and age, risk factors contributing to these diseases include poor diet, physical inactivity, smoking, and alcohol abuse; other factors range from hypertension, to high cholesterol, to overweight and obesity.

Mental health problems constitute one-fourth of the total disease burden in the Americas, as measured by disability-adjusted life years (DALYs) lost. Notwithstanding, in most countries a significant gap exists between the magnitude of mental health disorders and the health sector’s response to them. Mental

health care tends to concentrate on dealing with psychiatric problems—anxiety, depression, and substance abuse. Disasters are major a cause of mental disturbances.

Oral health continues to be a critical aspect of public health in the Americas, because of its contribution to overall morbidity, the high costs of treatment, and the increase in oral health inequities. While the prevalence of dental caries in the Region has dropped 35%–85% since 1995, oral disease continues to be high compared to other parts of the world. Poor oral health services and their limited coverage contributed to these high rates. Scientific evidence points to a causal relationship between oral health and health in general. Fluoridation programs, the promotion of simple technologies, and health systems that integrate oral health with general health care can lead to reduced oral disease.

In Latin America and the Caribbean, two-thirds of the incidence of eye disease—namely, blindness and visual impairment—can be attributed to treatable conditions such as cataracts, refractive errors, diabetic retinopathy, and glaucoma. According to national assessments, however, huge discrepancies exist in eye care service coverage—from close to 80% in well-developed urban areas to less than 10% in rural and remote areas—as well as in the quality of services provided. Prevention of eye disease has the potential to produce major savings for national economies; conversely, if large-scale preventive measures fail to be taken, the cost of eye disease is expected to more than double by 2020, to approximately US\$ 10 billion.

Sexual and reproductive health involves mostly maternal and child health and the health of adolescents and adults. Some 16.2 million children are born every year in the Region, 11.7 of them in Latin America. The regional population is increasing, but birth and fertility rates are dropping, although rates differ greatly from country to country. The sexual and reproductive health situation in Latin America and the Caribbean represents 20% of the total burden of disease in women and 14% in men—a clear gap. The use of birth control methods exceeds 60%, but considerably less than that in some countries. Although reporting differs among sources, and huge disparities occur among countries of the Region, the World Health Organization (WHO) estimates that of the 16.2 million births registered in the Americas in 2003, 22,680 maternal deaths occurred—a rate of 140/100,000 live births—principally resulting from abortion, preeclampsia, and hemorrhage. WHO further estimated that 280,000 perinatal deaths had occurred in 2006. Again, disparities are wide: the risk of perinatal deaths in Latin America and the Caribbean is three times that in Canada and the United States. Sexual and reproductive health relates directly to the high rates of birth among adolescents in Latin America and the Caribbean, where one in three females under 19 years of age has had a child.

Malnutrition in children and noncommunicable chronic diseases in adults, which pose problems in all the countries of the Region, are in large measure the results of poor diet. The growing tendency for children to be over recommended weights places them at later risk for chronic diseases. Breast-feeding is the single most important practice to reduce infant morbidity and mortality and a significant and preventable mode of

mother-to-child transmission of HIV, the main cause of pediatric HIV. Micronutrient deficiencies—of iron, vitamin A, zinc, vitamin B12, folate, and iodine—continue to be public health concerns that greatly impact human development and economic productivity. The coupling of nutritional problems with physical inactivity is a recipe for major increases in noncommunicable chronic diseases.

Disasters are a constant in the Americas and in large part correlate to geography: volcanoes in Central America and the Andean countries; storms and hurricanes in the Atlantic and Pacific oceans and in the Gulf of Mexico; flooding in the Southern Cone; and El Niño affecting almost the entire Region. These disasters have a huge impact as measured by numbers of persons affected, deaths, and economic damage.

Some 50 million indigenous people live in the Americas, and in some countries they represent the majority of the population. They tend to be poorer, less educated, more unemployed, and in worse health—with higher rates of maternal and infant mortality, malnutrition, and infectious diseases—than their compatriots. In some countries, alcoholism, suicide, drug abuse, and sexually transmitted infections are disproportionately higher among indigenous populations. Their poor health status is compounded by discrimination and inequity within the health system. To redress this situation, many countries have drafted national policies and established funding for indigenous-focused health programs.

The population of the Americas includes an estimated 250 million Afro-descendants. Most of the countries in the Region do not disaggregate data on this group, rendering an analysis of its health status difficult. Nevertheless, available information indicates that the situation with regard to Afro-descendants is extremely vulnerable in South America, where in a number of countries they are disproportionately poorer and less educated, suffer higher rates of infant and child mortality as well as of HIV and other poverty-related diseases, have less access to drinking water, and represent a smaller proportion of doctors and other health workers. While the situation is generally not as serious in Central America, in one country in the isthmus child mortality rates are higher and health professionals fewer among Afro-descendants.

The focus on family and community health integrates programs that enable individuals, as both family and community members, to manage their health throughout the life cycle and enables the greater coverage and efficiency of, as well as more direct participation in, health services. Health indicators improve significantly by emphasizing the role of the family in health promotion and protection, prevention of exposure to risks, and early diagnosis and rehabilitation.

Youth between the ages of 10 and 24 represent 28% of the population in Latin America and the Caribbean. Of the 161 million youth in the Region, the largest share lives in the poorest countries. Many indigenous youth live on the margins of the predominant culture, in their own communities. Approximately half of adolescents in the Region are sexually active, and about half of those use no birth control or protection of any kind. Dealing with the problem is hampered by cultural beliefs and practices. Another major problem af-

flicting the health of youths is violence, with homicide figuring as one of the principal causes of death among 10–19 year olds. Youths' health is further undermined by their lifestyle choices—the consumption of alcohol, tobacco, and drugs; poor nutrition and physical inactivity; and the growing prevalence of overweight and obesity.

Although the aging of the population varies considerably throughout the Americas, by the mid-21st century all but five of the countries of the Region will have as many inhabitants over 60 years of age as under 15 years, and a few countries will have twice as many elderly as young people. Reductions in infectious diseases and in infant and child mortality have translated into longer lives. More than three in four individuals born in Latin America and the Caribbean today will live to be older than 60, and two in five will celebrate their 80th birthday. The challenge for health policymakers and health systems will be to ensure that those living beyond 60 can celebrate not only their longevity but their good health and functionality.

Uniform epidemiological analysis regarding disabilities is lacking throughout the Americas, making it difficult to assess the dimensions of disability in the Region; reported prevalence rates range from over 14% in Brazil to less than 4% in Venezuela. The most common types of disability relate to mobility, communication, and social participation. The most frequent causes are age-related degeneration, chronic diseases, accidents, problems stemming from pregnancy and delivery, and occupational diseases.

Neglected diseases—infectious, parasitic diseases that afflict millions of poor people in Latin America and the Caribbean—are a patent expression of inequities in health. Included under the rubric of neglected diseases are intestinal helminthiasis, schistosomiasis, lymphatic filariasis, leptospirosis, leishmaniasis, cysticercosis, Chagas' disease, and onchocerciasis—all of which disproportionately affect indigenous populations, minority ethnic groups, slum and rural dwellers, and migrant workers. Together, the toll of these diseases on workers' productivity and, consequently, countries' economic development is huge. Yet inexpensive medications, health promotion, and environmental sanitation could effectively control and eliminate them.

Emerging and reemerging infectious diseases are becoming a growing threat to global health security, stemming from disease outbreaks in one country or region that can spread to others and from the intentional or accidental release of biological agents. Since 2001, the Region has experienced a series of significant disease outbreaks related to emerging and reemerging diseases that have required international public health interventions.

POPULATION CHARACTERISTICS AND TRENDS¹

CONSEQUENCES OF THE DEMOGRAPHIC TRANSITION

The concept of demographic transition² has been useful in describing the effect that the social, political, and economic changes have had on mortality and fertility trends in developed countries (the United States and Canada, in the case of the Americas). To some degree, this concept has also been theoretical food for thought, fueling speculations that the developing countries of the 20th century—accounting for practically all of the Americas—would undergo similar transitions and at more or less the same time frame. However, birth and mortality indicators in Latin American and Caribbean countries have evolved differently (due more to the spread of technological innovation in health than to sustained, equitable development) and in different time frames (because they evolved faster than in the more developed countries and have been less tied to economic, social, and political crises sweeping the Hemisphere in recent decades). This situation had led to consequences in terms of inequality, inasmuch as the so-called “population explosion”³—resulting from a slowdown in the decrease in the birth rate with respect to that of the mortality rate—has been sustained, for the most part, by the poorer segments of society.

What is certain nearly a century later is that the visible expressions of this process during the early years of the 21st century show certain characteristics that merit consideration and that define a continent with a very low population growth and low fertility and mortality rates, thus giving the appearance of stability and equilibrium. Indicators at the national level mask differences that need to be pointed out, given their impact on the population's characteristics and because these differences need to be considered in formulating social policy generally and health policy specifically. In terms of the Region as a whole, these characteristics can be summarized as follows:

- In little more than 30 years, median annual population growth rates in Latin American and Caribbean countries have decreased nearly 50%, dropping appreciably during the last two decades, from annual averages on the order of 2.7% during 1950–1955 to 1.5% at this writing. Consequently, the Region's population more than tripled between 1950 and 2000, skyrocketing from 161 million inhabitants in 1950 to 561 million in 2005. The population of the Region, expressed as a percentage of the world's total population, increased slightly over this same period (from less than 7% to nearly 9%).
- By 2005, most countries had either achieved low levels of fertility and stabilized mortality (in full demographic transition, characterized by low population growth) or were experiencing an advanced stage of demographic transition, with only slight or no population growth. Guatemala is the only country of the Region currently in a moderate stage of demographic transition, inasmuch as its fertility rate has remained higher than that of the other countries.⁴
- Annual population growth rates reveal the first important difference between the countries of the Region, ranging from 0.3% in Cuba to 2.5% in Honduras (Figure 1).
- Fertility rates in the Region, which were among the world's highest 40 years ago, are now at very low levels, and in many cases fall below the world average. Figure 2 illustrates the second significant difference among the Region's countries with respect to fertility: a difference of nearly three children per woman between the countries on either extreme.
- Mortality in the Region, which began a sustained decline during the first half of the 20th century, is reflected in a 20-year increase in life expectancy at birth for both sexes, increasing to 72 years over 2000–2005—or eight years higher than in all other developing regions of the world, although at levels experienced by developed countries 35 years ago. Figure 3 illustrates the third great difference among the countries of the Region: a nearly 30-year variation in life expectancy between the countries at either extreme.

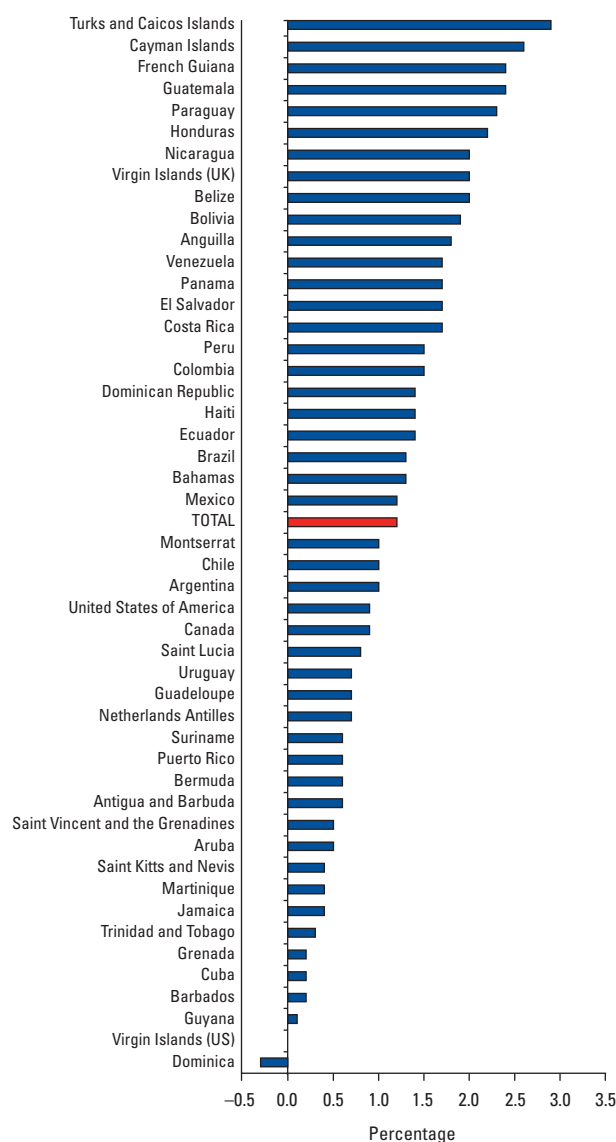
The above-mentioned changes in fertility and mortality have altered the population structure, owing to differences in growth among age groups. Accordingly, this has brought about a shift in the distribution of the dependent population (ages 0–14 and age 60 and older) with respect to the economically active population (ages 15–59). This shift reveals two trends that merit closer examination: a declining population dependence (defined as the dependent population—or the sum of the 0–14 plus the 60 and older age groups—divided by the economically active popula-

¹This section was prepared in conjunction with the United Nations Latin American and Caribbean Demographic Centre (CELADE, Population Division of the Economic Commission for Latin America and the Caribbean [ECLAC]), pursuant to an agreement between PAHO and ECLAC. The content is based on references 1–4; information cited in figures 1, 2, 3, and 5 was furnished by the PAHO Regional Core Health Data Initiative (RCHDI) (<http://www.paho.org/Spanish/SHA/coredata/tabulator/newTabulator.htm>).

²This concept makes it possible to describe the passage from high to low levels of mortality first and then of fertility, with consequences for population growth and population structure by sex and age.

³The transition from high to low birth and mortality rates has not occurred uniformly in the countries of the Americas and, with the exception of countries where this transition occurred earlier—Canada and the United States first, followed later by Argentina, Cuba, and Uruguay—most countries have experienced extremely high population growth rates due to persistent high fertility rates amid rapid drops in mortality. This process of rapid growth is known as the *population explosion*.

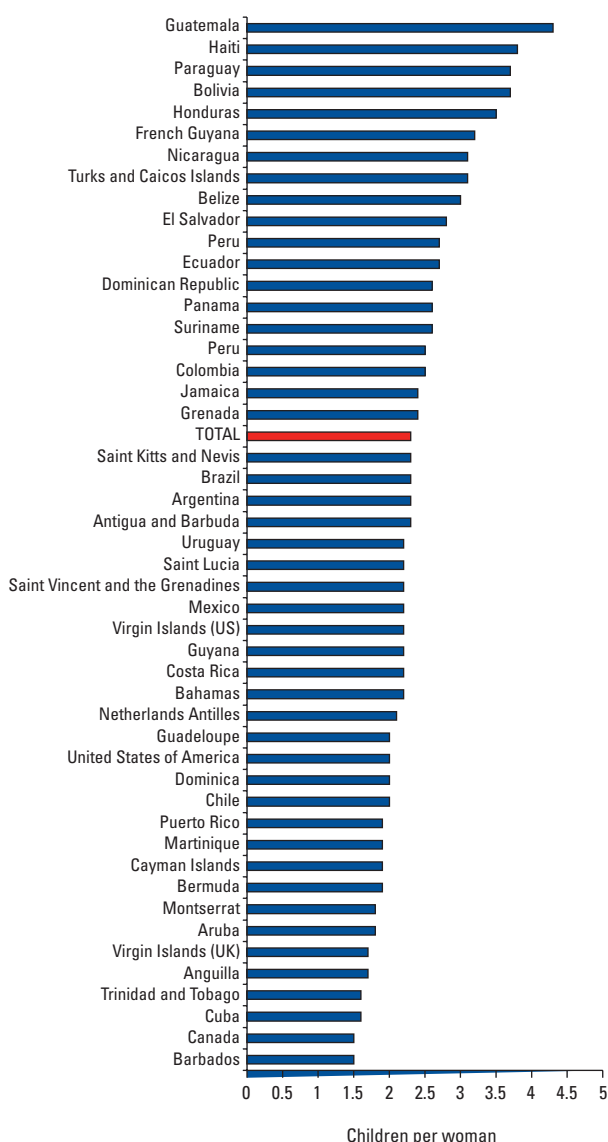
⁴Clear differences exist between countries in the process of demographic transition. Upon considering Canada and the United States within the group of developed countries in the original demographic transition model, said countries are actually in post-transition stages.

FIGURE 1. Annual population growth rate (%), Region of the Americas, 2005.

Source: PAHO Regional Core Health Data and Country Profile Initiative (RCHDI) (<http://www.paho.org>).

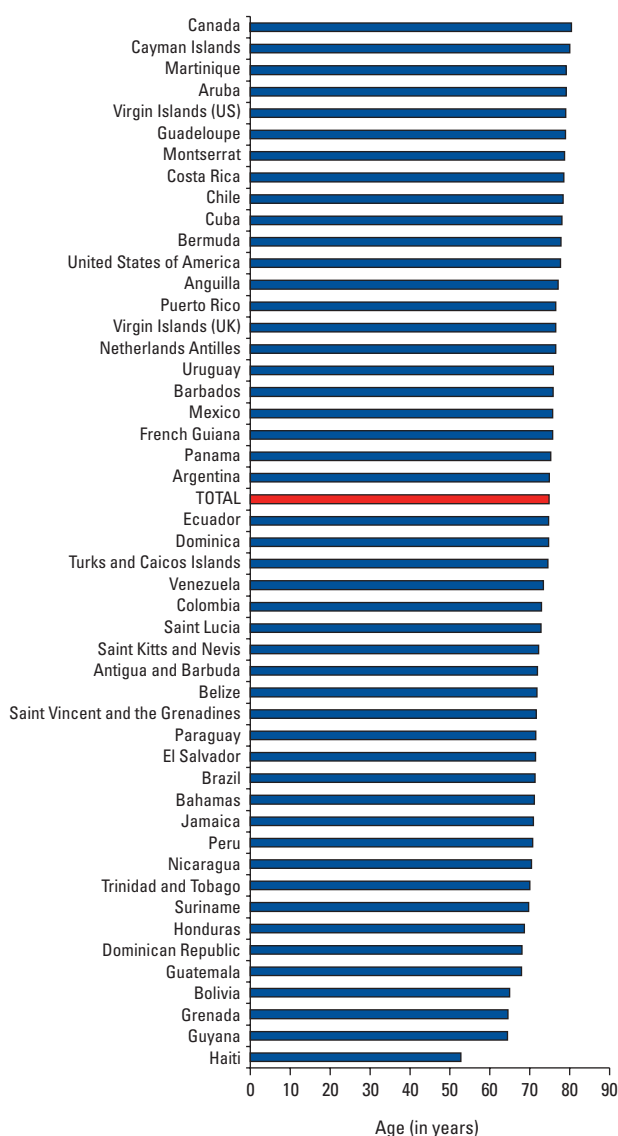
tion—or the 15–59 age group) and the aging of the population (understood as the portion of the population over age 60 years above a given percentage level).

The decline in the population dependency ratio is associated with the economic “burden” the economically-active population must assume to satisfy the demand of the dependent population. The lower the dependency ratio, the lower this burden, which is considered desirable for society as a whole. Projections indicate that for a certain period specific to each country (Figure 4), the dependency ratio will fall below 60, which is considered a “demo-

FIGURE 2. Total fertility rate, Region of the Americas, 2005.

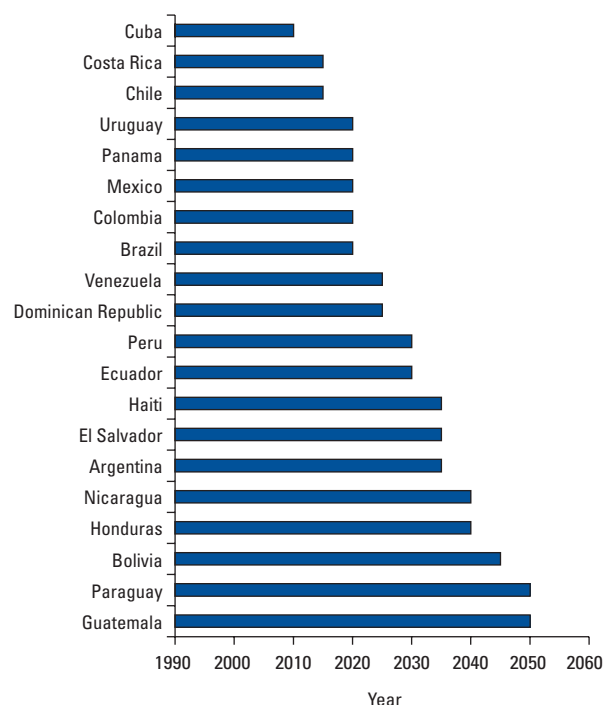
Source: PAHO Regional Core Health Data and Country Profile Initiative (RCHDI) (<http://www.paho.org>).

graphic dividend,” meaning that the countries will experience a “dividend” in terms of less demand pressure from children. This dividend should be used to invest in productive sectors and to reallocate social spending, primarily as a means for improving the quality of education and health-sector reforms, with a view to changing the epidemiological profile. Once this window of opportunity closes (i.e., due to an increase in the proportion of older adults), the specific demand in the health sector will be much more costly than it was for children. Unfortunately, there is no evidence to suggest that countries are using this demographic

FIGURE 3. Life expectancy at birth (years), Region of the Americas, 2005.

Source: PAHO Regional Core Health Data and Country Profile Initiative (RCHDI) (<http://www.paho.org>).

window of opportunity to their advantage, inasmuch as the job demand generated by the swelling ranks of the economically active population is being met instead with excessively flexible, precarious, and/or informal employment arrangements that are more beneficial to middle- and high-income households, which are precisely those that have experienced greater declines in fertility. If this “dividend” is to help poor sectors, income redistribution policies must be implemented to ensure that all of society can benefit from any resources freed up due to a lower dependency ratio.

FIGURE 4. Year the population dividend will “end,” selected countries, Region of the Americas.

Source: CELADE, Population Division of ECLAC, 2005.

Moreover, as the demographic transition progresses, the Latin American and Caribbean population is slowly and relentlessly aging, with annual rates of nearly 3.5%, much higher than the 1.5% average rate. In all countries of the Region, the proportion and absolute number of persons 60 years old and older will increase steadily over the next decades. The elderly population will grow between three and five times faster than the total population in 2000–2025 and 2025–2050, respectively. Consequently, the percentage of persons aged 60 and older will triple between 2000 and 2050. Social insurance and health systems could very well face definitive collapse without a redistribution of income and an equitable distribution of the opportunities derived from macroeconomic development.

In order to do this, men and women must be guaranteed equal employment and social protection opportunities, and health coverage must be ensured for the urban and rural poor, as well as for different ethnic groups in many countries of the Region. In terms of health, it will be necessary to redefine the role and characteristics of health care according to an approach based on the need to preserve the independence of older adults as long as possible, thus postponing disability; to initiate a reengineering of health systems with a view to training qualified human resources so they can provide comprehensive care of older adults; and to focus on disease prevention and health promotion actions targeted to

each life-cycle stage, and not only to the elderly population. The longevity of women merits special attention, since its effects will need to be taken into account in health policies.

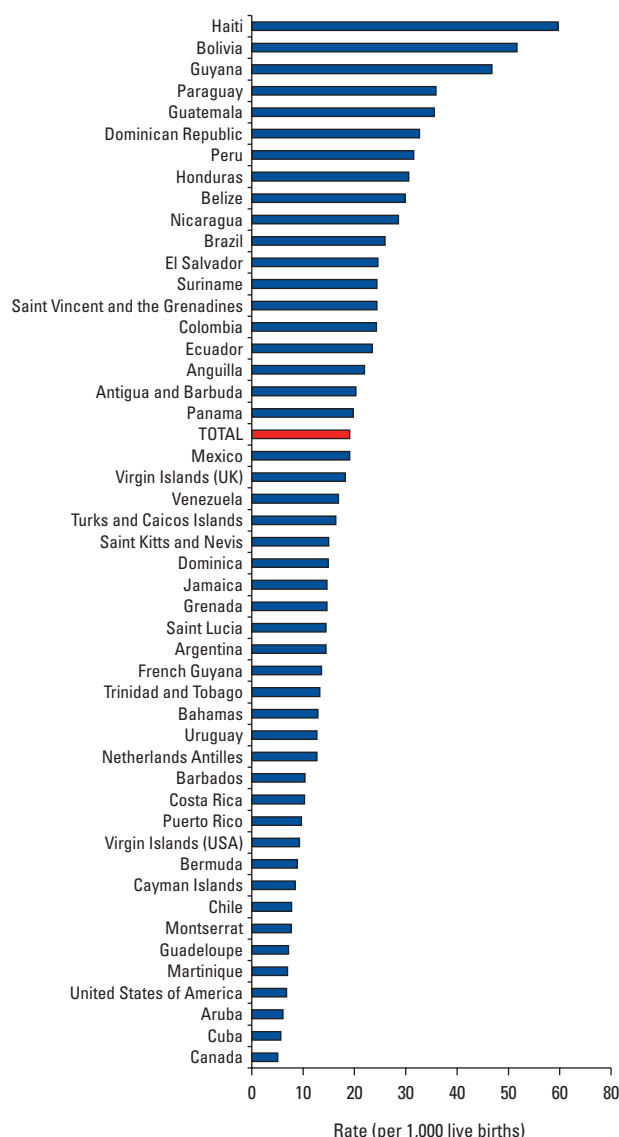
DIFFERENCES AND INEQUITIES IN FERTILITY AND MORTALITY

Despite the decline in fertility over the last 30 years and the limited impact of economic and social crises on these changing profiles, certain characteristics of the Region of the Americas should be pointed out, with a view to better understand the demands that health systems must cope with. The main challenges in this regard include:

- Fertility rates range from below the replacement level (fewer than two children per woman) in Canada, Cuba, the United States, and other Caribbean island nations to nearly four children per woman in Guatemala and Haiti (see Figure 2).
- Low total fertility stands in contrast with an increase in adolescent fertility, which has spiked in recent years in most countries, especially among young people under 18 years of age. This trend—which is much more frequent among poor segments of society—is linked to the school drop-out rate and has been steadily increasing among unmarried persons or those not in a stable union.
- Generally, there is a high negative correlation between fertility and certain economic and social development indicators, such as per capita gross domestic product, level of schooling, illiteracy, exposure to the mass media, and levels of poverty. If the use of contraceptives is factored into the analysis (i.e., prevalence use of modern methods among women in common law relationships), this variable in fact captures the main differences in fertility among countries, and most of the remaining variables lose statistical significance. Accordingly, this situation reinforces the need for effective, universally applied reproductive health policies.
- Disparities observed within countries are even greater than differences between countries, since fertility is highest among the poorest of the population—groups with lower levels of education and indigenous populations that have been historically marginalized. In some countries such as Bolivia, Guatemala, and Honduras, fertility among uneducated women is three times higher than among women who have completed secondary or higher education. This gap holds true in countries where vast segments of the population are still not using modern and safe birth control methods.
- In terms of differences in fertility among ethnic groups, census data (2000) show that indigenous populations continue to have high fertility rates.

Despite the significant reduction in mortality mentioned previously (especially among the young), which has brought about

FIGURE 5. Estimated infant mortality rate (per 1,000 live births), Region of the Americas, 2004.



Source: PAHO Regional Core Health Data and Country Profile Initiative (RCHDI) (<http://www.paho.org>)

an increase in the life expectancy of the population of the Americas, and in light of important changes in the epidemiological profile of death and disease by cause (which points to an improvement in the health of the population), significant inequalities remain:

- Infant mortality in Latin America has dropped from an average of 128 deaths in children under 1 year old per 1,000 live births in 1950–1955 to only 28 deaths in 2000–2005. There are significant differences between countries, however (Figure 5). Moreover, this indicator continues to be higher

among the most disadvantaged populations (indigenous groups, rural populations, and groups in which mothers have low levels of education), in which preventable causes constitute the leading causes of death. This points to the fact that the battle against premature mortality in the Region has yet to be won completely.

- Although the gap among countries with respect to life expectancy at birth is closing, significant inequalities remain that account for a difference of almost 30 years between countries on either extreme (see Figure 3).
- In all Latin American countries, female mortality is lower than male mortality. Consequently, life expectancy at birth for females is nearly seven years more than for males. Beyond biological differences between the sexes, there are some diseases that are unique to women, such as the complications of pregnancy and delivery, which have been battled with better success than diseases primarily affecting men, such as those associated with cardiovascular disease, external causes (violence), and certain types of malignant tumors. Moreover, men delay seeking timely health care compared to women.
- Maternal morbidity and mortality are considered among the most important public health problems of developing countries. Although their numbers are not terribly high, maternal morbidity and mortality are unacceptable because they can be easily avoided in most cases. According to available estimates, approximately half a million (515,000) women died worldwide due to this cause in 1995. In Latin America and the Caribbean, maternal deaths that year accounted for approximately 22,000 deaths, or approximately 4% of the total worldwide.
- Mortality has increased in some countries among certain age groups of the population, due to the persistence or re-emergence of epidemics of communicable diseases such as cholera, hantavirus, malaria, Chagas' disease, tuberculosis, and dengue—all of them diseases of poverty.
- The incidence of HIV/AIDS is lower in the Americas than in other regions of the world. Because it is lower, some countries have not made much effort to reduce mortality due to this cause, especially among specific population groups. In the Region, which accounts for approximately 8% of the world's population, some 1.5 million persons were infected with HIV by the end of 2002 (220,000 contracted the disease in 2005), representing 3.6% of the 42 million cases worldwide. The disease is most relevant in Haiti, Honduras, and other countries of the Caribbean.

INTERNATIONAL AND INTERNAL MIGRATION

International and internal migrations are two aspects of the same process and are population components that underscore inequalities in terms of how people leave their countries and how they move around within their countries. This holds important

“Acute respiratory infections—especially pneumonia in its various forms—and influenza continue to cause a major proportion of disease and suffering in the Americas.”

Hugh Cumming, 1932

consequences for the well-being of significant contingents of people and can have negative health consequences for both migrants and for those who remain.

External migration is very much linked to earlier and current population changes in the Region. In recent years it has been characterized by a significant increase in migration to North America (especially to the United States and, to a lesser degree, to Canada) and to Europe (especially Spain). Migration within Latin America and the Caribbean has remained at the same levels as in the past, with migration flows largely targeting the traditional receiving countries, such as Argentina and Costa Rica. This phenomenon has not occurred uniformly among population groups, and the specific characteristics of this migration in terms of gender, age groups, and socioeconomic status have deeply affected the social and family structures of the Region's countries. The main characteristics of recent trends in this regard may be summarized as follows:

- It is estimated that 20 million Latin American and Caribbean persons currently reside outside their country of birth. This unprecedented figure is the result of a massive increase in migration that has been going on for more than a decade, mainly involving migrations to the United States (75% of migrants), as well as unprecedented new migratory flows to Europe, especially to Spain.
- Of this number, 15 million migrants were already in the United States by 2000, 54% of which were Mexican, followed by Cubans, Dominicans, and Salvadorans. Migrations to other destinations involved a total of five million people, three-quarters of whom went to Canada, some European countries (especially Spain and the United Kingdom), Japan, Israel, and Australia. The remaining two million migrated to other Latin American and Caribbean countries (Argentina, Costa Rica, and Venezuela continue to have the highest numbers). In the Caribbean, significant numbers of Haitians continue to migrate to the Dominican Republic.
- The flow of migrants—which is likely to continue and even to increase in the future, despite restrictions imposed by some countries—is fueled by difficulties in fulfilling the demand for new jobs and deteriorating standards of living in many of the Region's countries. Other factors that have fed the flow are technological innovations, better access to information regarding opportunities outside the homeland, improved transportation facilities, and migrant community networks.

- The lack of legal status that many immigrants must contend with and the absence of a social safety net for legal immigrant workers are important issues for consideration given their impact on migrant health, which is reflected in extremely weak and discriminatory integration mechanisms, which particularly affect women. Undocumented migrants with low levels of education and who work in unskilled jobs are more prone to risks and exclusion.
- Trends point to a significant “feminization” of migratory flows—a distinguishing characteristic of Latin American and Caribbean migration with respect to other regions of the world. The nature of migratory flows by sex is closely related to the complementary nature of the countries’ labor markets, demand for service-based jobs, and the effects of family reunification. Female migration features specific characteristics that should be taken into account in health-sector planning and policies.

Internal migration, which has a long and deeply-rooted history in the Region, also results in inequities and disparities in terms of access to goods and services for a significant portion of the migrant population and for the receiving population. The main features of recent trends in this demographic component may be summarized as follows:

- Internal migration has resulted in the highest degree of urbanization in the developing world. Three of every four inhabitants of Latin America and the Caribbean live in urban areas. In most countries, migrants target large cities (one of every three persons of the Region resides in a city with more than one million inhabitants) and most settle in the largest city, accounting for more than one-quarter of a country’s population and one-third of its urban population.
- Internal migration also occurs between cities and is selective, in that migrants tend to be women and young people. Generally, the likelihood of a person migrating increases with education level.
- In recent decades a trend toward migration to mid-sized cities has been observed, as well as migrations to areas specializing in producing raw material for export or that offer advantages in terms of trade (i.e., border areas).
- Recent years have witnessed: i) moderate internal migration within Latin America and the Caribbean at rates below that of the most developed countries, such as the United States and Canada; ii) a predominance of flows between urban areas; iii) persistent net outmigration from the countryside, which continues to greatly affect rural areas, inasmuch as it explains the intensified aging of their populations, which is beyond what would be expected as a result of these areas’ stage in the demographic transition; iv) constant forced migrations as a result of internal conflicts in

several of the Region’s countries; v) ongoing migration from major metropolitan areas to more dynamic mid-sized cities that offer a better quality of life, some of which lie within metropolitan areas; vi) the persistent and significant allure for migrants of some small-country capitals, with highly advantageous urban systems; vii) the polarization of inter-metropolitan population transfers, with the poor tending to move to city outskirts and higher-income families moving to rural areas near cities, where they take advantage of urban services and infrastructure and from which they commute daily into the city to work or study; and viii) a revival of the downtown areas of some cities due to repopulation programs.

- Migrants show selectivity by age and above-average education, and persistence—although declining—of the traditional feminine bias of internal migration and the highest levels of unemployment among recent immigrants. Also observed, however, is the fact that migrants’ income levels are equal to or higher than those of non-migrants (where key variables are controlled for, such as age, education, and family responsibility).
- With the exception of forced migration, migratory flows and the decision to migrate are fanned by expectations for better living conditions. Evidence suggests that migration has benefited many migrants, as evidenced in their higher median incomes, after controlling for other factors. However, significant numbers of migrants face difficulties integrating into the society where they settle, as is evidenced by higher rates of unemployment among recent immigrants, and difficult access to goods and services—to such a degree that some are unable to improve on their former living situation.

CONCLUSIONS

The analysis presented here summarizes the main demographic aspects that have a direct or indirect effect on the population’s health. Aging and the future consequences of the rapid growth in the proportion of the elderly population are at the heart of an evaluation and prospects of current and future health care systems. The rise in adolescent fertility and the rising reports and confirmations of maternal deaths are yet additional examples of the intertwined nature of demographic and health trends. If infant mortality and life expectancy are to improve, health systems must act to control preventable childhood illnesses and other diseases affecting the adult population, such as HIV/AIDS. The absorption of massive numbers of immigrants and, conversely, the emigration of large groups of the population from one country to another, pose challenges for health systems, which may collapse in the receiving countries under the weight of the new demands for services or in the source countries where demand dries up. The growth of urban populations and conse-

quent saturation of hospital supply in the most economically depressed urban areas with a significant poor population also pose challenges for public health.

Discussions point to the development of better mechanisms to close the current gaps, masked by national averages. Finally, access to demographic information at the national level, as well as the potential to access data for smaller areas where health events and disease occur, is an essential input for assessing the health situation, formulating health policies, and conducting follow-up and monitoring.

MORTALITY: EXTENT, DISTRIBUTION, AND TRENDS

OVERVIEW

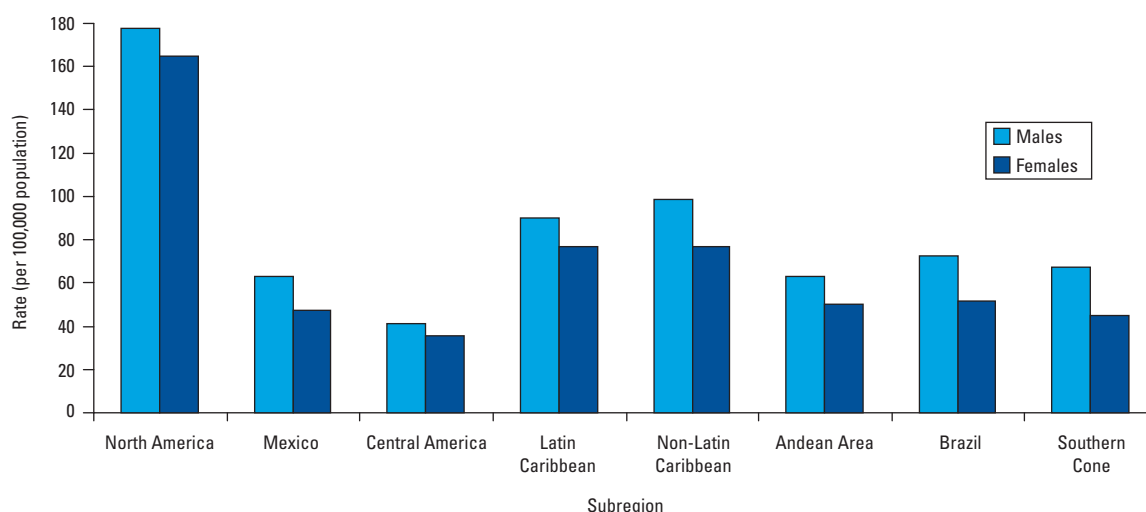
The mortality profile for the Region of the Americas has undergone significant changes in recent decades. In almost all of the countries, chronic degenerative diseases have overtaken communicable diseases as the leading causes of disease and death. Diseases of the circulatory system, neoplasms, chronic respiratory diseases, and diabetes are among the leading causes of death, along with external causes such as traffic accidents and homicide.

Several factors have contributed to this evolving profile, including changes in the population structure (aging), improvements in disease control and a lowered risk of death due to several diseases (such as vaccine-preventable diseases and intestinal infectious diseases), and the emergence of other diseases (such as HIV/AIDS). Changes have not occurred uniformly or with the same intensity in every country. This section examines the leading causes of death by sex and broad age groups for each of eight countries or subregions: the Andean Area, Brazil, Central America, the Latin Caribbean, the non-Latin Caribbean, Mexico, North America, and the Southern Cone (see Box 1: Technical Notes).

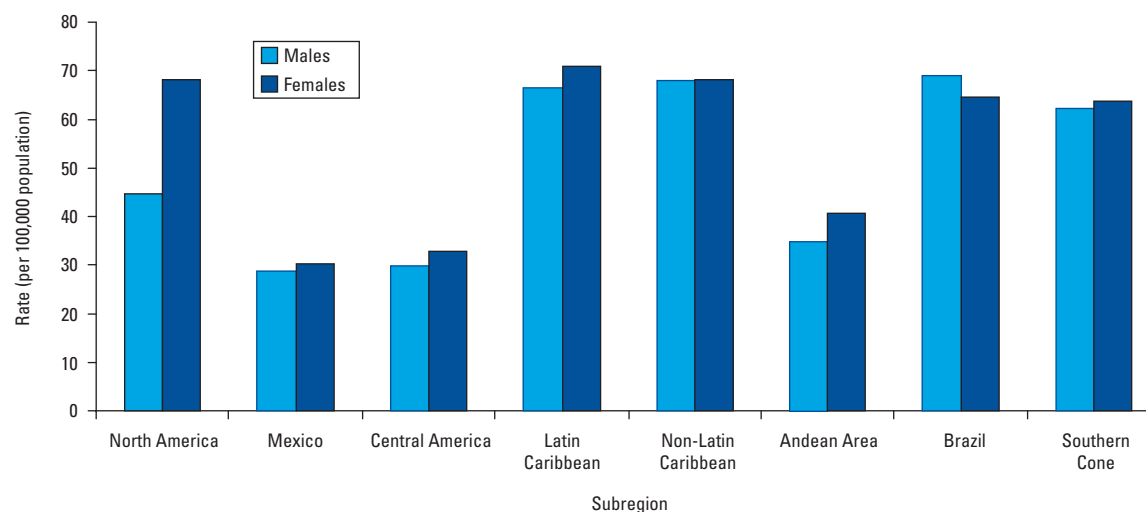
With respect to the population as a whole, four causes of death are consistently present within the ten leading causes of death for all eight subregions: ischemic heart disease (ranking from the first to the third leading cause), cerebrovascular disease (first to the fourth), diabetes mellitus (first to the seventh), and pneumonia and influenza (first to the eighth). In fact, with the exception of Central America and the Latin Caribbean, these same causes figure among the ten leading causes of death and disease in men and women alike. Likewise, chronic respiratory diseases appear among the ten leading causes of death in five of the eight subregions, with the exception of Central America, the Latin Caribbean, and the non-Latin Caribbean.

BOX 1. Technical Notes

1. Subregions. For this mortality analysis, countries and territories were classified into the following subregions:
 - North America: Bermuda, Canada, and the United States
 - Mexico
 - Central America: Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua
 - Latin Caribbean: Cuba, French Guyana, Guadeloupe, Haiti, Martinique, Puerto Rico, and the Dominican Republic.
 - Non-Latin Caribbean: Anguilla, Antigua and Barbuda, Bahamas, Barbados, Belize, Cayman Islands, Dominica, Guyana, Montserrat, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Turks and Caicos Islands, and the British and U.S. Virgin Islands.
 - Andean Area: Bolivia, Colombia, Ecuador, Peru, and Venezuela
 - Brazil
 - Southern Cone: Argentina, Chile, Paraguay, and Uruguay.
2. Data years. The source of data for each country or territory is the most recent available (past two to three years). On average, the data used for all subregions is circa 2002. Accordingly, the mortality rates appearing in the tables reflect the average of the corresponding period.
3. Rates. Specific mortality rates by cause and age have been calculated according to the methodology described in Health Statistics from the Americas, 2006 Edition (<http://www.paho.org/english/dd/ais/hsa2006.htm>).
4. Rank order. For this purpose, a specific list of the leading causes of death was prepared by PAHO and WHO in 2004 (A method for deriving leading causes of death, Bulletin of WHO, April 2006, 84(4) <http://www.who.int/bulletin/volumes/84/4/297.pdf>).

FIGURE 6. Mortality from ischemic heart disease, by sex, subregions of the Americas, circa 2002.

Source: Pan American Health Organization.

FIGURE 7. Mortality from cerebrovascular disease, by sex, subregions of the Americas, circa 2002.

Source: Pan American Health Organization.

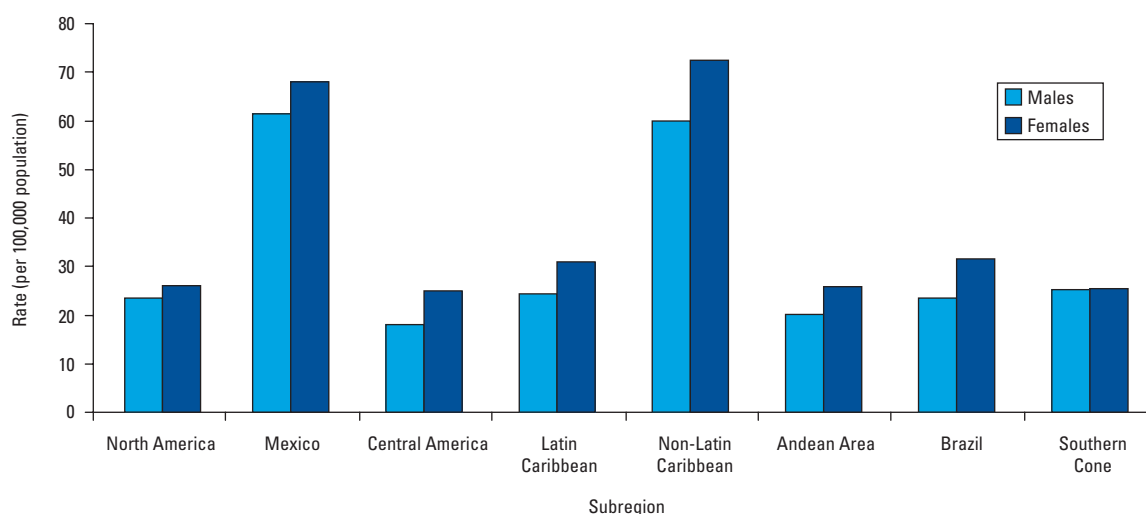
Figure 6 shows that men consistently have higher rates for **ischemic heart disease**. There are significant differences between subregions, with rates ranging between 35–50 per 100,000 population in Central America and Mexico, and up to more than 170 per 100,000 population in North America. Similarly, Central America and Mexico have lower mortality rates for **cerebrovascular disease** (Figure 7). In contrast to ischemic heart disease, mortality rates for cerebrovascular disease are highest among women in almost all subregions except for Brazil.

With regard to diabetes (Figure 8), although differences by sex have been decreasing in recent years, mortality rates continue to be higher among women than men. In the Southern Cone,

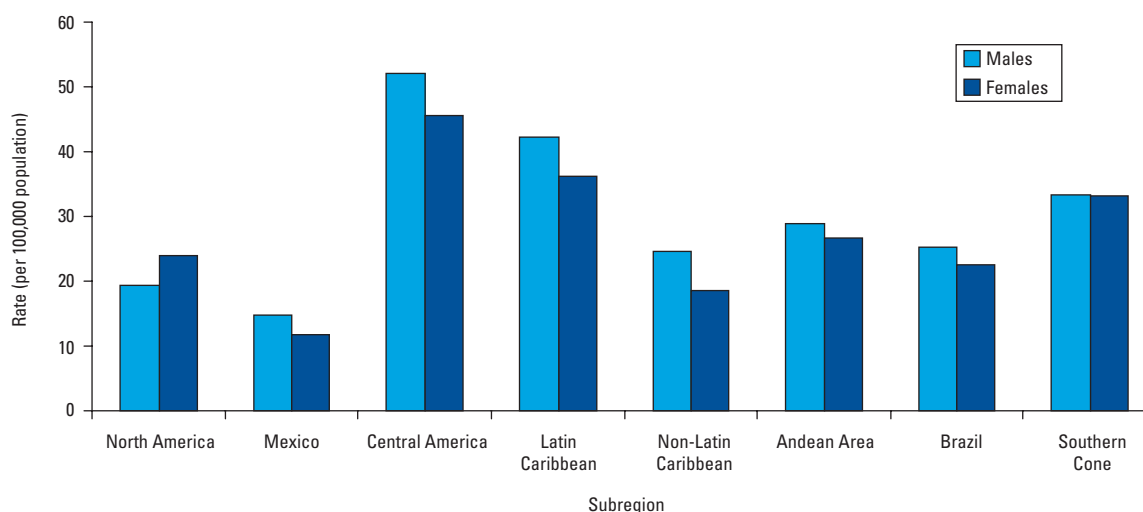
diabetes mortality rates are practically the same for men and women.

Mortality rates from **influenza and pneumonia** are highest among males in six of the eight subregions (Figure 9); North America and the Southern Cone being the exceptions.

Mortality rates from **chronic respiratory diseases** in Latin America range between 16 and 25 per 100,000 population for the population as a whole, and are consistently higher among men (Figure 10). In North America, these rates approach 42 per 100,000 population and are the same for both sexes. This group of diseases is not included among the leading causes of death for either sex in the non-Latin Caribbean.

FIGURE 8. Mortality from diabetes, by sex, subregions of the Americas, circa 2002.

Source: Pan American Health Organization.

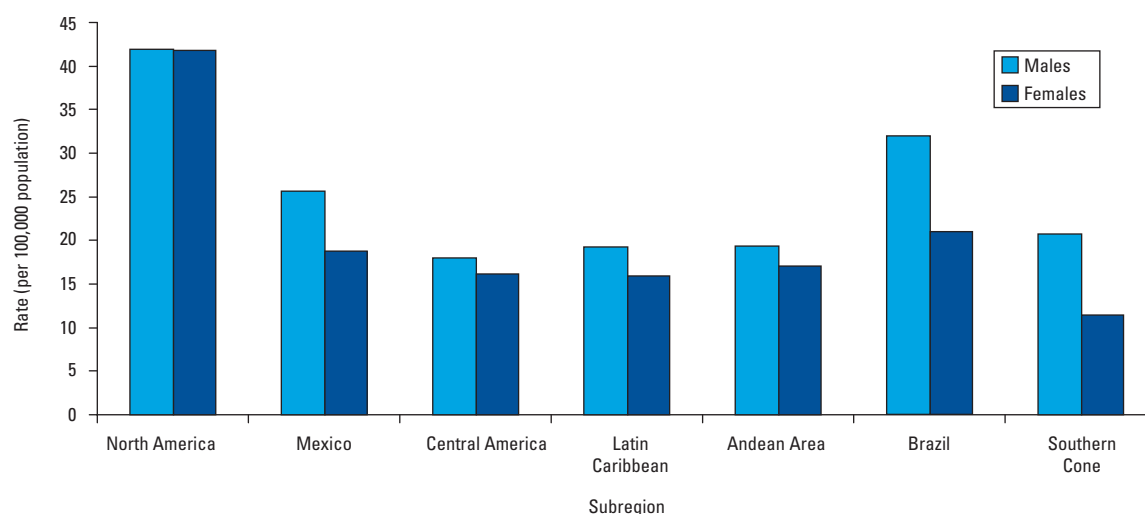
FIGURE 9. Mortality from pneumonia and influenza, by sex, subregions of the Americas, circa 2002.

Source: Pan American Health Organization.

Heart failure and complications and ill-defined descriptions of heart disease rank among the ten leading causes of death in all subregions except Mexico. On the one hand, this increases the relative weight of diseases of the circulatory system within overall mortality; on the other, it points to potential problems regarding imprecise medical certification of the causes of death, inasmuch as these conditions often are the terminal cause of death, but not necessarily the basic or underlying cause.

While the great majority of deaths from **conditions originating in the perinatal period** occur during the first months of life, they may also occur up to several years following birth. Although

infant mortality has decreased considerably in the subregions, there is still room to reduce it further. Moreover, because children continue to represent an important percentage of the overall population, these conditions continue to figure among the ten leading causes of death among the total population. Only in North America and in the Southern Cone countries, with their older populations and lower infant mortality rates, are these conditions not included among the ten leading causes of death for the total population. Nonetheless, they are the leading cause of death in children under 5 years old in all the subregions. In addition, **intestinal infectious diseases** continue to rank among the five

FIGURE 10. Mortality from chronic respiratory diseases, by sex, subregions of the Americas, circa 2002.

Source: Pan American Health Organization.

leading causes of death in children under 5 in all subregions except North America.

In Mexico, Central America, the Latin Caribbean, and the Andean Area the **maternal mortality** causes rank among the ten leading causes of death among females aged 10–59 years old, while in Brazil and the Southern Cone they are among the leading ten causes of death only in adolescent females aged 10–19 years old. In North America and the non-Latin Caribbean, the causes of maternal mortality do not rank among the ten leading causes of death for females in any age group. These findings, together with those discussed in the preceding paragraph suggest that much more progress will be needed to meet the Millennium Development Objectives (MDGs).

The impact of **external causes of death** on mortality also is important. Despite an observed decline in traffic accidents, they continue to rank among the leading causes of death in most of the subregions—only in the Southern Cone do traffic accidents not figure among the ten leading causes of death among males. Mortality due to homicide has been on the rise, particularly among young men and adolescent boys. Suicide constitutes an important component of mortality and is included among the leading causes of death in adolescents and young adults. In North America and the Southern Cone there are more suicides than homicides. Accidental drowning or submersion is also a significant cause of death.

ANALYSIS BY SUBREGION

North America

Ischemic heart disease accounts for 20.9% of all deaths in this subregion, for a mortality rate of 171.1 per 100,000 population

(the Region's highest), followed by cerebrovascular disease (6.9%) and malignant neoplasms of the trachea, bronchus, and lung (6.6%), the latter of which is the second leading cause of death among men (7.8% of deaths). Also important is the fact that dementia and Alzheimer's disease is the fourth cause of death among women and the fifth cause for the population as a whole; it does not figure among the ten leading causes of death in men (Table 1).

Other differences in mortality between the sexes can be seen with respect to malignant neoplasms. Neoplasm of the prostate is the sixth leading cause of death among men; breast cancer holds the corresponding rank for women. For men, malignant neoplasms of the hematopoietic and lymphatic systems account for the seventh leading cause of death, and malignant neoplasm of the colon for the ninth, although these diseases are not included among the ten leading causes of mortality in females.

Almost half of all deaths of children under 5 in both sexes are due to conditions originating in the perinatal period, with another more than 20% attributable to congenital malformations. External causes account for most of the remaining 30%, including traffic accidents, homicide, and accidental drowning or submersion.

Among the population aged 5–19, which is the group with the lowest risk of death overall, external causes contributed most to mortality in both sexes, with traffic accidents constituting the leading cause, followed by homicide. Suicide is the third leading cause of death among the population aged 10–19 years old, and affects both sexes equally. Mortality rates for all causes among 5–9-year-olds and 10–19-year-olds are the lowest in the Region, at 0.15 and 0.42 per 1,000 population, respectively.

Malignant neoplasms of the trachea, bronchus, and lung is the leading cause of death among women 20–59 years old in North

TABLE 1. Rates, percentage, and cumulative percentage (based on defined causes) of the ten leading causes of death, by sex, North America, circa 2002.

Deaths	Total			Males			Females		
	Rank	Rate (per 100,000 population)	%	Cumulative %	Rank	Rate (per 100,000 population)	Cumulative %	Rank	Rate (per 100,000 population)
Total	—	830.7	100.0	—	—	830.4	100.0	—	831.0
Ill-defined causes	—	—	1.3	—	—	—	1.3	—	—
Defined causes	—	819.9	100.0	—	—	819.6	100.0	—	820.2
Ischemic heart disease	1	171.1	20.9	20.9	1	177.6	21.7	1	164.9
Cerebrovascular disease	2	56.6	6.9	27.8	3	44.6	5.4	2	68.1
Malignant neoplasm of the trachea, bronchus, and lung	3	54.5	6.6	34.4	2	64.2	7.8	3	45.1
Chronic diseases of the lower respiratory tract	4	41.8	5.1	39.5	4	41.9	5.1	5	41.8
Dementia and Alzheimer's disease	5	32.0	3.9	43.4	—	—	—	4	44.6
Diabetes mellitus	6	24.8	3.0	46.4	5	23.4	2.9	8	26.1
Heart failure	7	22.4	2.7	49.2	—	—	—	7	26.5
Pneumonia and influenza	8	21.7	2.6	51.8	10	19.4	2.4	9	23.9
Malignant neoplasm of the colon, sigmoid, rectum, and anus	9	20.1	2.5	54.3	9	20.5	2.5	—	—
Malignant neoplasm of the hematopoietic and lymphatic systems	10	19.6	2.4	56.7	7	21.3	2.6	—	—
Malignant neoplasm of the breast	—	—	—	—	—	—	—	6	28.8
Malignant neoplasm of the prostate	—	—	—	—	6	22.0	2.7	—	—
Disease of the genitourinary system	—	—	—	—	—	—	—	10	20.9
Traffic accidents (terrestrial)	—	—	—	—	8	21.3	2.6	—	—

— Not among the ten leading causes.

Source: Mortality database, PAHO/HDW/HA.

America; nevertheless, despite representing only the fourth leading cause among men, the male mortality rate (20.4 per 100,000 population) for this cause is higher than that for the female population (16.9 per 100,000 population). Traffic accident rates are almost three times higher for males (24.7 per 100,000 population) than females (9 per 100,000 population), representing the second and fourth leading causes, respectively. Among men in this same age group (20–59), ischemic heart disease is the leading cause of death, and, as mentioned earlier, traffic accidents are the second, followed by suicide, lung cancer, cirrhosis, and homicide. Death from HIV/AIDS, which was among the highest ranking causes of death in the mid-1990s, began trending downward in the late 1990s. After lung cancer, ischemic heart disease is the second leading cause of death among women, followed by breast cancer, traffic accidents, cerebrovascular disease, and cirrhosis.

Beginning at age 60, for both sexes, the leading causes of death are diseases of the circulatory system (ischemic heart disease and cerebrovascular disease) and neoplasms (cancer of the lung for both sexes, of the breast in women, and of the prostate in men), in addition to dementia and Alzheimer's disease, chronic respiratory disease diseases, and diabetes, presenting similar profiles for both sexes and with slightly higher rates among men.

Mexico

The leading cause of death for Mexico's total population is diabetes mellitus, accounting for 12.8% of deaths; it is the leading cause among women, responsible for 15.7% of deaths, and the second leading cause among men, with 10.6% of deaths (Table 2). As does the non-Latin Caribbean, Mexico has one of the highest rates in the Americas for both sexes, with more than twice the rates of any other subregion.

Ischemic heart disease and cerebrovascular disease rank among the four leading causes of death in Mexico for both men and women, as in all other subregions. Cirrhosis is the country's third leading cause of death, for a rate of 32 per 100,000 population (49.5 among men and 15.4 among women). Moreover, Mexico is the only subregion in which cirrhosis is included among the ten leading causes of death in women (fifth leading cause). It is the leading cause of death among men aged 20–59 (15%) and the second leading cause among women (6.1%). For men, traffic accidents, chronic respiratory diseases, conditions originating in the perinatal period, and homicides continue to figure prominently. Among women, chronic respiratory diseases constitute the fourth leading cause, followed by cirrhosis, conditions originating in the perinatal period, hypertensive disease, diseases of the urinary system, pneumonia and influenza, and nutritional deficiencies and anemias (2.5% of all female deaths) rounding up the tenth cause—Mexico is the only subregion where this occurs.

Among children under 5 years old, conditions originating in the perinatal period and congenital malformations account for 60% of total deaths, followed, in order of importance, by pneu-

monia and influenza, intestinal infectious diseases, accidental obstruction of the respiratory tract, and malnutrition. The same holds true with respect to the leading causes of death among both boys and girls, although mortality rates are slightly higher among boys for all these diseases.

Among Mexico's female population aged 5–19 years old, the leading causes of death are traffic accidents, followed by malignant neoplasms of the hematopoietic and lymphatic systems, congenital malformations, diseases of the urinary system, suicide (third leading cause among the 10–19-year-olds), and homicide; complications of pregnancy, childbirth, and the puerperium is the seventh leading cause among the age group 10–19 years old. Traffic accidents are also the leading cause of death among males in the 5–19 age group, followed by homicide, malignant neoplasms of the hematopoietic and lymphatic systems, accidental drowning or submersion, and congenital malformations. Mortality rates for the age group 5–19 are consistently lower than those of other groups, although rates for males are always higher than for females, especially with regard to external causes. As is the case for the female population, suicide is the third leading cause of death among males.

Among the population 20–59 years old, diabetes is the leading cause of death for women and the second for men; cirrhosis is the first leading cause for men and the second for women. After these two causes, the causes of death for the male population, in rank order, are traffic accidents, homicides, ischemic heart disease, and HIV/AIDS. The third to sixth causes of death are ischemic heart disease, malignant neoplasms of the uterus, malignant neoplasms of the breast, and cerebrovascular disease.

After age 60 the leading causes of death for both sexes are diabetes, ischemic heart disease, cerebrovascular disease, and chronic respiratory diseases.

Central America

The leading cause of death for both sexes in this subregion are pneumonia and influenza (8.6% of total deaths), whose rate is more than double that seen in most of the other subregions. This may partly be due to shortcomings in the medical certification of death, inasmuch as pneumonias are often fatal but the basic or underlying cause is not stated on the death certificates. Among the male population, pneumonia and influenza are followed by homicide, ischemic heart disease, intestinal infectious diseases, and conditions originating in the perinatal period, whereas the corresponding order for the female population is ischemic heart disease, cerebrovascular disease, intestinal infectious diseases, and diabetes. It bears mentioning that Central America is the only subregion in which intestinal infectious diseases are included among the ten leading causes of death, accounting for the fourth leading cause in both sexes (Table 3).

Among children under 5, the leading causes of death for both sexes, in rank order, are conditions originating in the perinatal

TABLE 2. Rates, percentage, and cumulative percentage (based on defined causes) of the ten leading causes of death, by sex, Mexico, circa 2002.

Deaths	Total			Males			Females		
	Rank	Rate (per 100,000 population)	%	Cumulative %	Rank	Rate (per 100,000 population)	Cumulative %	Rank	Rate (per 100,000 population)
Total	—	514.8	100.0	—	—	591.2	100.0	—	441.6
Ill-defined causes	—	—	2.0	—	—	—	1.8	—	—
Defined causes	—	504.5	100.0	—	—	580.6	100.0	—	431.4
Diabetes mellitus	1	64.7	12.8	12.8	2	61.3	10.6	1	67.9
Ischemic heart disease	2	55.1	10.9	23.7	1	63.1	10.9	2	47.4
Cirrhosis of the liver and other chronic liver diseases	3	32.3	6.4	30.1	3	49.8	8.6	5	15.5
Cerebrovascular disease	4	29.5	5.8	36.0	4	28.8	5.0	3	30.2
Chronic diseases of the lower respiratory tract	5	22.1	4.4	40.4	6	25.7	4.4	4	18.8
Conditions originating in the perinatal period	6	19.2	3.8	44.2	7	23.2	4.0	6	15.5
Traffic accidents (terrestrial)	7	16.5	3.3	47.5	5	26.5	4.6	—	—
Pneumonia and influenza	8	13.2	2.6	50.1	9	14.7	2.5	9	11.8
Disease of the genitourinary system	9	13.1	2.6	52.7	10	14.2	2.4	8	12.0
Hypertensive disease	10	12.5	2.5	55.1	—	—	—	7	14.2
Assault (homicides)	—	—	—	—	8	19.0	3.3	—	—
Malnutrition and nutritional anemias	—	—	—	—	—	—	—	10	11.0
									2.5

— Not among the ten leading causes.
Source: Mortality database, HDM/HA/PAHO.

TABLE 3. Rates, percentage, and cumulative percentage (based on defined causes) of the ten leading causes of death, by sex, Central America, circa 2002.

Deaths	Total			Males			Females		
	Rank	Rate (per 100,000 population)	%	Cumulative %	Rank	Rate (per 100,000 population)	Cumulative %	Rank	Rate (per 100,000 population)
Total	—	643.5	100.0	—	—	721.9	100.0	—	566.2
Ill-defined causes	—	—	11.9	—	—	—	10.8	—	—
Defined causes	—	566.9	100.0	—	—	643.9	100.0	—	490.9
Pneumonia and influenza	1	48.8	8.6	8.6	1	52.0	8.1	1	45.6
Ischemic heart disease	2	38.5	6.8	15.4	3	41.3	6.4	2	35.7
Cerebrovascular disease	3	31.4	5.5	20.9	6	29.9	4.6	3	32.8
Intestinal infectious diseases	4	28.5	5.0	26.0	4	31.3	4.9	4	25.8
Conditions originating in the perinatal period	5	26.4	4.7	30.6	5	30.6	4.8	6	22.1
Assault (homicides)	6	25.3	4.5	35.1	2	45.8	7.1	—	—
Diabetes mellitus	7	21.5	3.8	38.9	—	—	—	5	24.9
Heart failure	8	19.7	3.5	42.4	10	18.2	2.8	7	21.1
Cirrhosis of the liver and other chronic liver diseases	9	19.2	3.4	45.7	7	26.4	4.1	—	—
Diseases of the genitourinary system	10	16.6	2.9	48.7	9	21.0	3.3	—	—
Traffic accidents (terrestrial)	—	—	—	—	8	24.0	3.7	—	—
Chronic diseases of the lower respiratory tract	—	—	—	—	—	—	—	8	16.1
Cardiac arrest	—	—	—	—	—	—	—	9	14.4
Malignant neoplasms of the uterus	—	—	—	—	—	—	—	10	13.0

— Not among the ten leading causes.

Source: Mortality database, PAHO/HDM/HA.

period, intestinal infectious diseases, pneumonia and influenza, congenital malformations, and malnutrition. Central America and the Latin Caribbean are the only subregions of the Americas where vaccine-preventable diseases still rank among the ten leading causes of death for this age group (seventh leading cause in Central America and tenth in the Latin Caribbean).

Homicide is the leading cause of death among Central American males aged 5–19 years old, followed by traffic accidents, external causes of undetermined intent, pneumonia and influenza, and accidental drowning or submersion. Among females in this age group, the leading causes are pneumonia and influenza, intestinal infectious diseases, traffic accidents, and external causes of undetermined intent. Central America is the only subregion where vaccine-preventable diseases figure among the leading causes of death for this age group (eighth leading cause).

Among the Central American population 20–59 years old, homicide is the leading cause of death. The extent of male mortality from this cause is such that while only representing the tenth leading cause among females, it still ranks as the leading cause for the total population of this age group. Among males, the leading causes of death are homicide, cirrhosis, traffic accidents, adverse effects of psychoactive drugs (including alcohol), and external causes of undetermined intent. Among females, the leading causes of death are malignant neoplasms of the uterus, diabetes, cerebrovascular disease, pneumonia and influenza, and ischemic heart disease.

With regard to older adults (age 60 and over), the five leading causes of death for both sexes are ischemic heart disease, followed by cerebrovascular disease, pneumonia and influenza, diabetes (fourth among women, fifth among men) and heart failure (fifth among women, fourth among men).

Latin Caribbean

The three leading causes of death for both sexes are ischemic heart disease, cerebrovascular disease, and pneumonia and influenza (Table 4). Among women, these are followed by diabetes, hypertensive disease, and HIV/AIDS, and among men, by HIV/AIDS; malignant neoplasms of the trachea, bronchus, and lung; and intestinal infectious diseases. It is important to bear in mind that the presence of HIV/AIDS as a leading cause is heavily influenced by the number of deaths from this cause in Haiti, where the disease constitutes the leading cause of death. This is also the case in mortality from malnutrition and intestinal infectious diseases among the youngest age groups.

Among children 0–4 years old, the five leading causes of death are the same for both sexes: conditions originating in the perinatal period; malnutrition; intestinal infectious diseases; pneumonia and influenza; and congenital malformations.

Among the population aged 5–19, the four leading causes of death are the same for both sexes: traffic accidents; intestinal infectious diseases; HIV/AIDS; and external causes of undeter-

mined intent. In addition, the causes of maternal mortality constitute the second leading cause among the female population aged 10–19.

Among the population aged 20–59, the leading cause of death for both sexes is HIV/AIDS. Among men in this age group, HIV/AIDS is followed by ischemic heart disease, traffic accidents, homicide, and cerebrovascular disease; among women, it is followed by cerebrovascular disease, ischemic heart disease, and the causes of maternal mortality.

Mortality profiles have remained practically identical for both women and men after age 60, with only slightly higher rates among men. The three leading causes of death for both sexes are ischemic heart disease, cerebrovascular disease, and pneumonia and influenza. For females, these are followed by diabetes, hypertensive disease, and heart failure, and, for males, by malignant neoplasms of the prostate, malignant neoplasm of the lung, and heart failure.

Non-Latin Caribbean

The leading causes of death for both sexes in this subregion are ischemic heart disease, cerebrovascular disease, and diabetes (Table 5). As does Mexico, the non-Latin Caribbean subregion has one of the highest mortality rates from diabetes in the Americas (between 60 and 72 per 100,000 population); it also has the highest HIV/AIDS mortality rates in the Americas, at 37.7 per 100,000 population among the general population, 48.3 per 100,000 among males (fourth leading cause), and 27.3 among women (fifth leading cause).

With respect to children under 5, the six leading causes of death for both sexes are conditions originating in the perinatal period (53.9%), congenital malformations (11.1%), intestinal infectious diseases (5.5%), pneumonia and influenza (3.9%), HIV/AIDS (3.5%), and malnutrition (2%).

Traffic accidents are the leading cause of death for both sexes in the age group 5–19 years old, followed by HIV/AIDS, homicide, suicide (the leading cause among adolescent females), and accidental drowning and accidental submersion.

HIV/AIDS is the leading cause of death among men and women aged 20–59 years old, at 15.7% and 14.9% of deaths, respectively. Among males of this group HIV/AIDS is followed by ischemic heart disease (10.2%), homicide (6.2%), diabetes (6.2%), and suicide (5.9%); among females, by diabetes (10.9%), ischemic heart disease (7.9%), cerebrovascular disease (6.7%), and malignant neoplasm of the breast (5%).

After age 60, the three leading causes of death for both sexes—and in very similar proportion—are ischemic heart disease (17.2%), cerebrovascular disease (14.1%), and diabetes (12.5%). Mortality rates are higher for men in terms of the first two causes; among women, rates are higher for diabetes. Among men of this group, these causes are followed in importance by malignant neoplasms of the prostate and hypertensive disease, and among women, by hypertensive disease and heart failure.

TABLE 4. Rates, percentage, and cumulative percentage (based on defined causes) of the ten leading causes of death, by sex, Latin Caribbean, circa 2002.

Deaths	Total			Males			Females		
	Rank	Rate (per 100,000 population)	Cumulative %	Rank	Rate (per 100,000 population)	Cumulative %	Rank	Rate (per 100,000 population)	Cumulative %
Total	—	872.6	100.0	—	953.0	100.0	—	793.1	100.0
Ill-defined causes	—	—	15.3	—	—	15.7	—	—	14.8
Defined causes	—	739.1	100.0	—	803.4	100.0	—	675.7	100.0
Ischemic heart disease	1	83.5	11.3	1	90.2	11.2	1	76.9	11.4
Cerebrovascular disease	2	68.7	9.3	2	66.5	8.3	2	70.8	10.5
Pneumonia and influenza	3	39.2	5.3	3	42.2	5.3	3	36.2	5.4
HIV/AIDS	4	31.8	4.3	4	36.5	4.5	6	27.1	4.0
Diabetes mellitus	5	27.7	3.7	—	—	—	4	30.9	4.6
Hypertensive disease	6	26.8	3.6	10	24.7	3.1	5	28.8	4.3
Conditions originating in the perinatal period	7	26.4	3.6	7	26.7	3.3	8	26.0	3.8
Intestinal infectious diseases	8	25.8	3.5	6	27.8	3.5	9	23.8	3.5
Heart failure	9	25.3	3.4	—	—	—	7	26.2	3.9
Malignant neoplasm of the trachea, bronchus, and lung	10	19.0	2.6	5	29.1	3.6	—	—	—
Traffic accidents (terrestrial)	—	—	—	8	25.3	3.1	—	—	—
Malignant neoplasm of the prostate	—	—	—	9	25.2	3.1	—	—	—
Chronic diseases of the lower respiratory tract	—	—	—	—	—	—	10	15.9	2.4

— Not among the ten leading causes.

Source: Mortality database, HDM/HA/PAHO.

TABLE 5. Rates, percentage, and cumulative percentage (based on defined causes) of the ten leading causes of death, by sex, non-Latin Caribbean, circa 2002.

Deaths	Total			Males			Females		
	Rank	Rate (per 100,000 population)	Cumulative %	Rank	Rate (per 100,000 population)	Cumulative %	Rank	Rate (per 100,000 population)	Cumulative %
Total	—	683.4	100.0	—	766.5	100.0	—	602.6	100.0
Ill-defined causes	—	—	3.3	—	—	2.9	—	—	3.8
Defined causes	—	660.8	100.0	—	744.3	100.0	—	579.7	100.0
Ischemic heart disease	1	87.6	13.3	1	98.7	13.3	1	76.8	13.2
Cerebrovascular disease	2	68.0	10.3	2	67.9	9.1	3	68.1	11.7
Diabetes mellitus	3	66.3	10.0	3	60.0	8.1	2	72.4	12.5
HIV/AIDS	4	37.7	5.7	4	48.3	6.5	5	27.3	4.7
Hypertensive disease	5	33.5	5.1	6	31.2	4.2	4	35.7	6.2
Pneumonia and influenza	6	21.6	3.3	7	24.6	3.3	7	18.6	3.2
Heart failure	7	20.1	3.0	—	—	—	6	20.0	3.5
Conditions originating in the perinatal period	8	19.8	3.0	8	23.0	3.1	8	16.6	2.9
Malignant neoplasm of the prostate	9	16.4	2.5	5	31.9	4.3	—	—	—
Traffic accidents (terrestrial)	10	13.9	2.1	9	22.3	3.0	—	—	—
Assault (homicides)	—	—	—	10	21.3	2.9	—	—	—
Malignant neoplasm of the breast	—	—	—	—	—	—	9	16.3	2.8
Malignant neoplasm of the uterus	—	—	—	—	—	—	10	15.2	2.6

— Not among the ten leading causes.

Source: Mortality database, PAHO/HDM/HA.

Andean Area

Homicide is the leading cause of death among men (15.1% of all deaths) and constitutes the second leading cause among the total population in this subregion, despite its absence among the women's ten leading causes of death (Table 6). Male mortality from homicide, which is the highest of all the subregions, approaches 87.3 per 100,000 men. Within the subregion, rates are highest in Colombia, about three times that of the other countries in the subregion.

Among the general population and among women, ischemic heart disease is the leading cause of death. Ischemic heart disease is the second leading cause of death for men, followed by cerebrovascular disease, traffic accidents, pneumonia and influenza, and conditions originating in the perinatal period. With respect to women, ischemic heart disease is followed by cerebrovascular disease, pneumonia and influenza, diabetes, conditions originating in the perinatal period, and hypertensive disease.

Among the age group 0–4 years old, the five leading causes of death for both sexes, with very similar proportions and mortality rates, are conditions originating in the perinatal period (39.7% of deaths), congenital malformations (12.4%), pneumonia and influenza (11.5%), intestinal infectious diseases (6.1%), and malnutrition (4.6%).

Among males in the age group 5–19 years old, the five leading causes of death are external causes (more than 70% of total deaths); homicide is first among the external causes at 42%, followed by traffic accidents, external causes of undetermined intent, suicide (among adolescents), and accidental drowning or submersion. Among females of this group, the three leading causes of death are also external causes—traffic accidents, homicide, and suicide—followed in fourth place by malignant neoplasms of the hematopoietic and lymphatic systems, and in fifth, by external causes of undetermined intent. It is important to note that this last category includes homicides, suicides, and accidents of undetermined intent. This makes external causes even more important than the figures suggest.

Among the population aged 20–59, the mortality profile varies by sex. Among women, the leading causes of death are malignant neoplasms of the uterus (7.1% of total female deaths), cerebrovascular disease (7%), ischemic heart disease (6.6%), homicide (5.1%), and malignant neoplasms of the breast (5%). Among men, the leading cause is homicide, accounting for 28.8% of deaths, followed by ground transportation accidents (8.8%), ischemic heart disease (6.3%), external causes of undetermined intent (6%), and HIV/AIDS (3.5%).

Beginning at age 60, the six leading causes of death are the same for both sexes, albeit not in the same order. Ischemic heart disease is the leading cause of death for both sexes, accounting for 16% of total deaths, followed by cardiovascular disease (9.2%). Among women, these are followed by diabetes, hypertensive disease, pneumonia and influenza, and chronic respiratory diseases, accounting for 7.3%, 5.9%, 5.7%, and 5.3% of deaths in women,

respectively. Among men, chronic respiratory diseases (6%) are the third leading cause of death, followed by pneumonia and influenza (5.3%), diabetes (5%), and hypertensive disease (4.9%).

Brazil

As Table 7 illustrates, the two leading causes of death in Brazil are cerebrovascular diseases (10.6% of total deaths) and ischemic heart disease (9.8%), with similar percentages by sex. Among males, these causes are followed by homicide (7.8%, rate of 57.3 per 100,000 men), ground transportation accidents (4.4%), chronic respiratory diseases (4.3%), and conditions originating in the perinatal period (4.2%). Diabetes is the third leading cause of death among women, accounting for 6.1% of female deaths, followed by heart failure (4.7%), conditions originating in the perinatal period (4.4%), and pneumonia and influenza (4.3%).

Among children under 5, most deaths for both sexes are the result of conditions originating in the perinatal period (54.5%) and congenital malformations (12.1%), as is the case in all the subregions. These causes are followed by pneumonia and influenza (5.7%), intestinal infectious diseases (5%), and septicemia (3.1%). The mortality profile is roughly the same for children of both sexes in this age group, with rates slightly higher among boys.

Mortality due to external causes is the leading cause of death among the population aged 5–19, especially among males, for whom homicide ranks first (tenth leading cause among the 5–9-year-olds and first among 10–19-year-olds), accounting for nearly 40% of total deaths. Among the male population, these causes are followed by traffic accidents, accidental drowning or submersion, external causes of undetermined intent, and, in the case of adolescent boys, suicide. Among females, traffic accidents are the leading cause, followed by homicide and accidental drowning or submersion. Maternal mortality causes account for the fourth leading cause of death among adolescent girls, followed by suicide. Among girls aged 5–9, pneumonia and influenza, and malignant neoplasms of the hematopoietic and lymphatic systems are also significant causes of death.

Among the population aged 20–59 years old, the mortality profile by sex is quite different. The leading cause of death among women in this age group is cerebrovascular disease (11%), followed by ischemic heart disease (7.7%), malignant neoplasms of the breast (5.2%), diabetes (4.8%), and malignant neoplasms of the uterus (4.1%). Among men, homicide is the leading cause of death (15.9%), followed by traffic accidents (8.4%), ischemic heart disease (8.1%), cirrhosis (6.3%), and cerebrovascular disease (6.1%).

Beginning at age 60 the profile is practically the same for both sexes. Accordingly, cerebrovascular disease is the leading cause of death, accounting for 14.5% of deaths, followed by ischemic heart disease (12.9%). Chronic respiratory diseases are the third leading cause among men and fifth among women. Moreover, heart failure is the fourth leading cause for both sexes, while diabetes is fifth among men and third among women.

TABLE 6. Rates, percentage, and cumulative percentage (based on defined causes) of the ten leading causes of death, by sex, Andean Area, circa 2002.

Deaths	Total			Males			Females		
	Rate		Cumulative %	Rate		Cumulative %	Rate		Cumulative %
	Rank	(per 100,000 population)		Rank	(per 100,000 population)		Rank	(per 100,000 population)	
Total	—	589.7	100.0	—	674.9	100.0	—	504.8	100.0
Ill-defined causes	—	—	5.8	—	—	5.2	—	—	6.5
Defined causes	—	555.5	100.0	—	639.8	100.0	—	472.0	100.0
Ischemic heart disease	1	56.6	10.2	2	62.8	9.8	1	50.4	10.7
Assault (homicides)	2	47.6	8.6	1	87.3	13.6	—	—	—
Cardiovascular disease	3	37.8	6.8	3	35.0	5.5	2	40.6	8.6
Pneumonia and influenza	4	27.8	5.0	5	28.9	4.5	3	26.7	5.7
Conditions originating in the perinatal period	5	23.9	4.3	6	27.1	4.2	5	20.7	4.4
Diabetes mellitus	6	23.0	4.1	8	20.1	3.1	4	25.9	5.5
Traffic accidents (terrestrial)	7	19.8	3.6	4	30.6	4.8	—	—	—
Hypertensive disease	8	18.4	3.3	10	17.4	2.7	6	19.5	4.1
Chronic diseases of the lower respiratory tract	9	18.3	3.3	9	19.4	3.0	7	17.1	3.6
Heart failure	10	15.4	2.8	—	—	—	8	15.9	3.4
Event of undetermined intent	—	—	—	7	20.2	3.2	—	—	—
Malignant neoplasm of the uterus	—	—	—	—	—	—	9	15.5	3.3
Diseases of the genitourinary system	—	—	—	—	—	—	10	12.6	2.7

— Not among the ten leading causes.

Source: Mortality database, PAHO/HDM/HA.

TABLE 7. Rates, percentage, and cumulative percentage (based on defined causes) of the ten leading causes of death, by sex, Brazil, circa 2002.

Deaths	Total			Males			Females		
	Rank	Rate (per 100,000 population)	Cumulative %	Rank	Rate (per 100,000 population)	Cumulative %	Rank	Rate (per 100,000 population)	Cumulative %
Total	—	729.1	100.0	—	851.7	100.0	—	609.4	100.0
Ill-defined causes	—	—	14.0	—	—	13.4	—	—	14.8
Defined causes	—	627.0	100.0	—	737.6	100.0	—	519.2	100.0
Cerebrovascular disease	1	66.7	10.6	2	69.0	9.4	1	64.5	12.4
Ischemic heart disease	2	61.7	9.8	1	72.3	9.8	2	51.4	9.9
Assault (homicides)	3	30.8	4.9	3	57.3	7.8	—	—	—
Diabetes mellitus	4	27.6	4.4	10	23.5	3.2	3	31.6	6.1
Conditions originating in the perinatal period	5	27.0	4.3	6	31.2	4.2	5	22.8	4.4
Chronic diseases of the lower respiratory tract	6	26.4	4.2	5	32.0	4.3	7	21.0	4.0
Heart failure	7	24.3	3.9	9	24.3	3.3	4	24.4	4.7
Pneumonia and influenza	8	23.9	3.8	8	25.3	3.4	6	22.5	4.3
Traffic accidents (terrestrial)	9	19.9	3.2	4	32.7	4.4	—	—	—
Hypertensive disease	10	19.0	3.0	—	—	—	8	20.0	3.9
Neoplasm of the breast	—	—	—	—	—	—	9	13.2	2.5
Malignant neoplasm of the uterus	—	—	—	—	—	—	10	10.4	2.0
Cirrhosis of the liver and other chronic liver diseases	—	—	—	7	25.8	3.5	—	—	—

— Not among the ten leading causes.

Source: Mortality database, PAHO/HDM/HA.

Southern Cone

This is the only subregion of the Americas in which external causes are absent from the ten leading causes of death for both males and females. The four leading causes are the same for both sexes, although in different order. Among males, ischemic heart disease (8.8%) is the leading cause, followed by cerebrovascular disease (8.1%) and heart failure (7.6%). Among women, heart failure (10.1%) is the leading cause, followed by cerebrovascular disease (10%) and ischemic heart disease (7.1%). Pneumonia and influenza are the fourth leading cause for both sexes, accounting for 5.2% of female deaths and 4.3% of male deaths (Table 8). The fifth leading cause among males is malignant neoplasms of the trachea, bronchus, and lung, followed by diabetes and cirrhosis. Among women, malignant neoplasm of the breast is fifth, followed by diabetes and respiratory failure.

The leading causes of death among children under 5 are the same for both sexes and similar in terms of rates and percentage: conditions originating in the perinatal period (44.5% of total deaths in this age group), congenital malformations (19.9%), pneumonia and influenza (6.4%), intestinal infectious diseases (3.6%), and septicemia (2.8%).

After North America, the age group 5–19 years old in the Southern Cone has the lowest mortality rates from all causes, both for the 5–9 (0.31 per 1,000 population) and the 10–19-year-old subgroups (0.51). The leading cause of death for both sexes of these subgroups is traffic accidents (12.9% among males and 10.6% females). Other relevant causes among children 5–9 years old include malignant neoplasms of the hematopoietic and lymphatic systems, congenital malformations, and accidental drowning or submersion. Other significant causes of mortality among adolescents aged 10–19 are homicide (leading cause among males, at 10.8%, and third leading cause among females, at 11.5%), suicide (second among females at 10.8% and third among males at 11.5%), and malignant neoplasms of the hematopoietic and lymphatic systems (third among females at 6.6% and sixth among males at 4.4%).

Among men in the 20–59-year-old age group, the leading causes of death are ischemic heart disease (7.7%), cerebrovascular disease (6.7%), traffic accidents (6.3%), cirrhosis (5.5%), homicide (5.3%), and suicide (5.3%). The leading causes of death among women in the same age group are malignant neoplasm of the breast (8.9%), cerebrovascular disease (8.7%), malignant neoplasm of the uterus (6.6%), ischemic heart disease (3.9%), heart failure (3.6%), and diabetes (3.2%).

The mortality profile for the population aged 60 years old and older is similar for both sexes, with diseases of the circulatory system constituting the three leading causes—heart failure, ischemic heart disease, and cerebrovascular disease—and accounting for 30% of all deaths, followed by pneumonia and influenza with 5.5% of deaths. Among males in this age group, the next leading causes of death are malignant neoplasms of the tra-

chea, bronchus, and lung (4.4%), and diabetes (3.9%). Among females in this age group, diabetes is the fifth leading cause of death (4.4%), followed by respiratory failure (3.4%).

MORBIDITY

VACCINE-PREVENTABLE DISEASES

Immunization is one of the most cost-effective interventions available in public health. It plays a significant role in reaching the Millennium Development Goals of reducing child mortality and improving maternal health, and is a key tool for promoting socioeconomic development (5). The countries of the Americas have made immunization a top priority among the health interventions they pursue, and they have pioneered the effort to eradicate, eliminate, and control vaccine-preventable diseases (6)—the Region of the Americas was the first to eradicate smallpox and poliomyelitis, and the first to eliminate the endemic transmission of measles (5, 6). These achievements have been possible through sustained high levels of immunization coverage in the regular program, implementation of high-quality surveillance, and mass vaccination campaigns designed to rapidly reduce large susceptible populations.

Responsible management of national immunization programs, the development and execution of annual and multi-year plans of action, municipal-level planning, the promotion of coordination among immunization partners through national interagency committees, the training of health workers, effective supervision, and regular and sustained program evaluation are some of the key tools that have been used to implement strategies for the eradication, elimination, and control of vaccine-preventable diseases. The close monitoring of coverage and surveillance data at the local level and the validation of data, such as rapid coverage monitoring and active case searches, also are important tools. Ongoing efforts to finance immunization programs with regular government funds by having a budget line for immunization in the national budget, and ensuring that immunization legislation is in place also been essential for successfully sustaining immunization programs in the Americas (6). Finally, PAHO's Revolving Fund for the Purchase of Vaccines has been instrumental in supporting national immunization programs in the countries of the Americas by ensuring an uninterrupted supply of quality vaccines at affordable prices; the Fund has earned increasing supplier confidence through prompt payment and better forecasting (7).

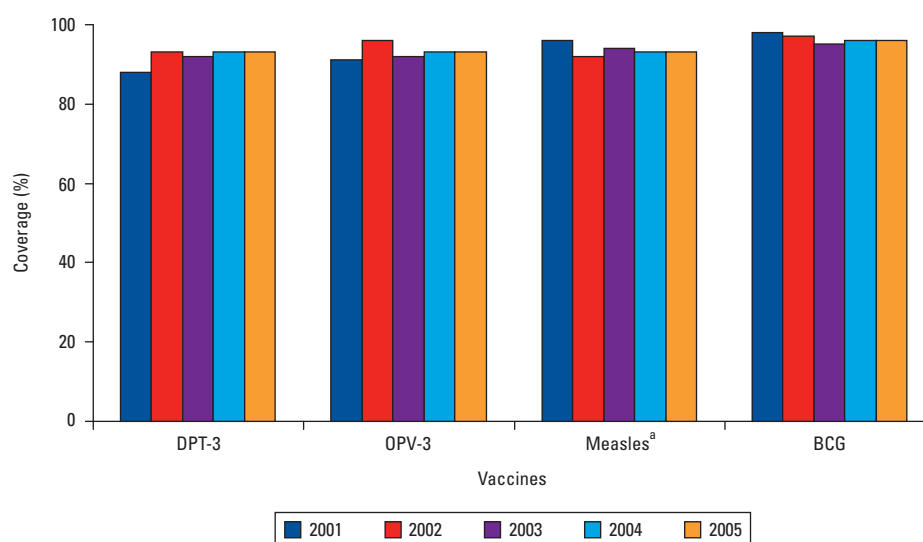
Yet, despite considerable gains, much remains to be done to address the unfinished immunization agenda, hold on to achievements, and confront the new challenges presented by an ever-changing and interdependent world. This section summarizes the main achievements in immunization in the Americas in 2001–2005 and highlights the challenges that loom ahead.

TABLE 8. Rates, percentage, and cumulative percentage (based on defined causes) of the ten leading causes of death, by sex, Southern Cone, circa 2002.

Deaths	Total			Males			Females		
	Rank	Rate (per 100,000 population)	Cumulative %	Rank	Rate (per 100,000 population)	Cumulative %	Rank	Rate (per 100,000 population)	Cumulative %
Total	—	757.5	100.0	—	826.0	100.0	—	691.3	100.0
Ill-defined causes	—	—	7.7	—	—	7.4	—	—	8.0
Defined causes	—	699.2	100.0	—	764.9	100.0	—	636.0	100.0
Cerebrovascular disease	1	63.0	9.0	2	62.2	8.1	2	63.7	10.0
Heart failure	2	61.2	8.8	3	58.2	7.6	1	64.0	10.1
Ischemic heart disease	3	56.0	8.0	1	67.3	8.8	3	45.1	7.1
Pneumonia and influenza	4	33.3	4.8	4	33.4	4.4	4	33.2	5.2
Diabetes mellitus	5	25.3	3.6	6	25.1	3.3	5	25.5	4.0
Malignant neoplasm of the trachea, bronchus, and lung	6	20.8	3.0	5	32.1	4.2	—	—	—
Diseases of the genitourinary	7	19.1	2.7	10	19.7	2.6	9	18.5	2.9
Respiratory failure	8	18.6	2.7	—	—	—	8	18.5	2.9
Septicemia	9	18.5	2.6	—	—	—	7	18.7	2.9
Chronic diseases of the lower respiratory tract	10	15.8	2.3	8	20.7	2.7	—	—	—
Neoplasm of the breast	—	—	—	—	—	—	6	24.5	3.9
Cirrhosis of the liver and other chronic liver diseases	—	—	—	7	22.3	2.9	—	—	—
Neoplasm of the prostate	—	—	—	9	20.5	2.7	—	—	—
Hypertensive disease	—	—	—	—	—	—	10	16.8	2.6

— Not among the ten leading causes.

Source: Mortality database, HDM/HA/PAHO.

FIGURE 11. Vaccination coverage of children under 1 year old, Latin America and the Caribbean, 2001–2005.

^aMeasles data reported for children aged 1 year, with the exception of Haiti.

Source: Country reports to PAHO, Family and Community Health, Immunizations.

Holding on to Achievements

Under the guiding principles of reducing inequities, strengthening public health infrastructure, fostering a prevention culture, and galvanizing political commitment, immunization programs in the Americas, have eradicated, eliminated, and significantly reduced the morbidity and mortality associated with vaccine-preventable diseases. Important by-products of this achievement have included strengthening the public health infrastructure, encouraging effective inter-sectoral coordination, promoting equity, and increasing the community's awareness about prevention (8).

An Umbrella of Protection

Immunization's umbrella of protection includes polio eradication; measles and neonatal tetanus elimination; and the control of pertussis, diphtheria, tetanus, invasive diseases caused by *Haemophilus influenzae* type b, and hepatitis B.

Regionwide, routine coverage for BCG,⁵ DTP-3,⁶ polio-3⁷ and measles-containing vaccines⁸ in children under 1 year old has been higher than 90% since 2002 (Figure 11). As a result of

this high coverage, the morbidity and mortality associated with vaccine-preventable diseases have been significantly reduced (Figure 12a, b, c, and d)

The countries of the Americas have expanded the umbrella of childhood protection by adding other vaccines to the six antigens of the original Expanded Program on Immunization (EPI). As of 2006, all countries in the Region, except Haiti, include measles-mumps-rubella (MMR), *Haemophilus influenzae* type b (Hib), and hepatitis B vaccines; 31 countries are using the pentavalent vaccine, which combines DTP, Hib, and hepatitis B antigens.

Poliomyelitis

More than 20 years have passed since PAHO Member States unanimously approved a resolution to eradicate the transmission of wild poliovirus from the Western Hemisphere (9). After the last case of poliomyelitis caused by a wild poliovirus that occurred in Peru in 1991, the countries of the Americas have remained free of the circulation of the indigenous wild poliovirus (10).

At the global level, significant progress has been made towards the goal of polio eradication: only 2,033 wild-polio cases were reported in 2005,⁹ and the number of polio-endemic countries is at the lowest in history (11). Recent episodes of the spread of wild poliovirus to countries that had interrupted transmission in Africa and Asia, however, highlight the constant risk for polio importation to the Americas (12). In addition to the risk of wild

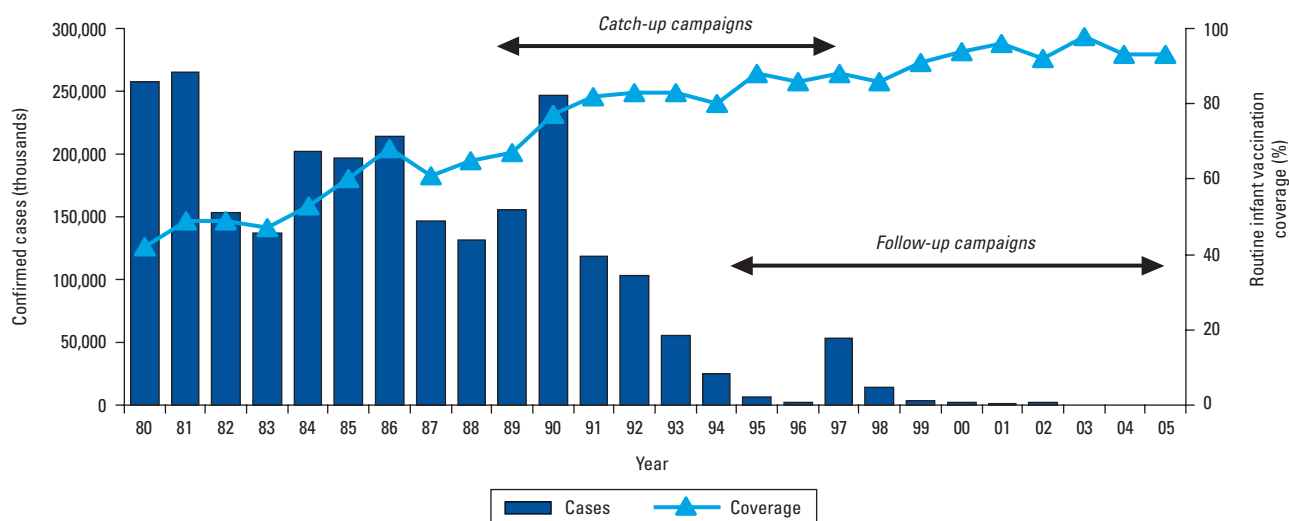
⁵BCG: bacille Calmette-Guérin, a vaccine against severe forms of tuberculosis.

⁶DTP: vaccine against diphtheria-pertussis-tetanus; DTP-3: third-dose of DTP, as DTP or a combination vaccine.

⁷Polio-3: third dose of polio vaccine (oral polio vaccine (OPV) or inactivated polio vaccine).

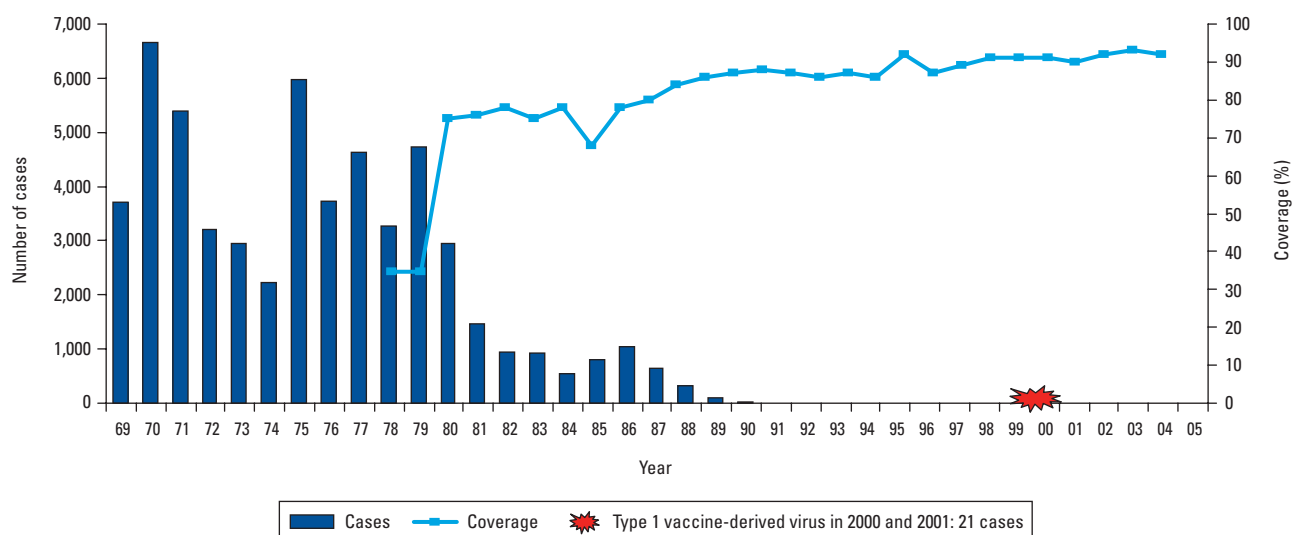
⁸Measles-containing vaccines refer to measles vaccines as a single antigen or in combination, most commonly as measles-mumps-rubella vaccine (MMR).

⁹ Data as of 22 June 2007, WHO Global Polio Eradication Initiative. http://www.who.int/immunization_monitoring/diseases/poliomyelitis/en/

FIGURE 12a. Umbrella of protection: measles elimination, Region of the Americas, 1980–2005.

Note: 81 confirmed cases in 2005.

Source: Country reports to PAHO, Family and Community Health, Immunizations.

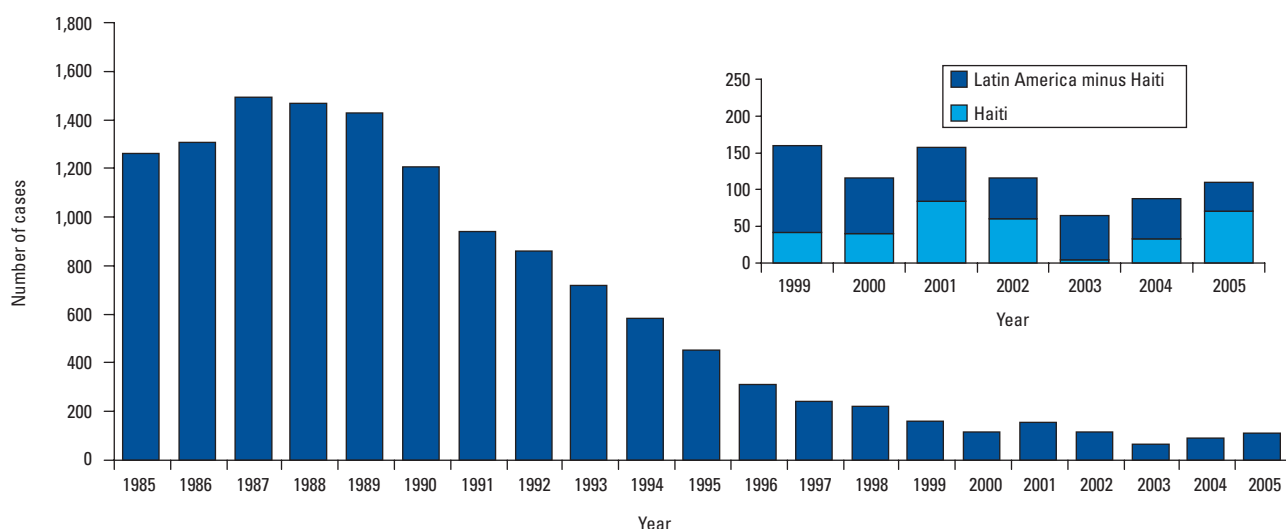
FIGURE 12b. Umbrella of protection, polio eradication, Region of the Americas, 1969–2005.

Source: Country reports to PAHO, Family and Community Health, Immunizations.

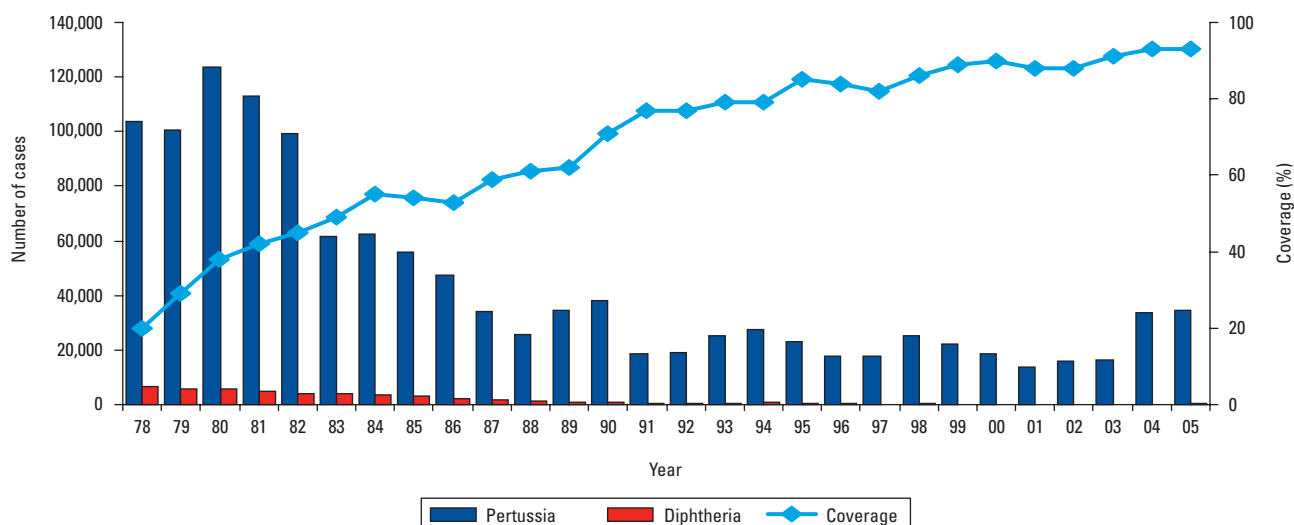
poliovirus importations, the outbreak of vaccine-derived poliovirus in the Dominican Republic and Haiti in 2000–2001 that resulted in 21 cases (13), a similar occurrence in the Philippines (14), and the 2005 circulation of vaccine-derived polio in the United States in a religious community that generally refuses vaccination (15), emphasize the risk of low oral polio vaccine (OPV) coverage in countries, municipalities, and communities,

as well as the risk of failing to timely detect poliovirus circulation. That said, the lack of spread of vaccine-derived poliovirus from isolated cases, such as a case of paralysis in an immunocompromised child in Peru in December 2003 (16), shows that high coverage will halt the circulation of the poliovirus.

As of 2006, all Latin American and Caribbean countries had continued to vaccinate against polio and maintained acute flaccid

FIGURE 12c. Umbrella of protection: neonatal tetanus elimination, Region of the Americas, 1985–2005.

Source: Country reports to PAHO, Family and Community Health, Immunizations.

FIGURE 12d. Umbrella of protection: diphtheria and pertussis, Region of the Americas, 1978–2005.

Source: Country reports to PAHO, Family and Community Health, Immunizations.

paralysis surveillance according to international standards. As stated earlier, polio-3 vaccination coverage is over 90% Region-wide, and most countries continue to administer OPV during supplementary immunization activities, such as the Vaccination Week in the Americas. The Regional acute flaccid paralysis rate remains at more than 1 per 100,000 children under 15 years old, and the proportion of cases with adequate specimens remains

close to 80%. It should be said, however, that these achievements are not uniform, and most countries have at-risk areas within their borders.

To minimize the risk for reintroduction of wild poliovirus from laboratories, the Region's countries carry out a containment plan for all poliovirus strains in laboratories. Phase I of the containment plan, inventorying all laboratories that have poliovirus

or potentially infected material, is expected to be ready by the end of 2006 (17).

Measles

In 1994, the countries of the Americas became the first in the world to commit themselves to interrupting the indigenous transmission of measles (18). In the 1990s, the annual number of measles cases diminished dramatically, from approximately 250,000 in 1990 to 2,109 in 1996 (Figure 12a). However, a large outbreak that began in São Paulo, Brazil, in 1997, resulted in 52,284 confirmed cases and 61 deaths in Brazil, spreading to neighboring countries (19). The outbreak underscored the need for aggressively implementing the elimination strategy developed by PAHO in order to eliminate measles (20).

To achieve and maintain high levels of measles immunity, the elimination strategy adopted by the Latin American and Caribbean countries includes a three-tiered vaccination approach: a one-time-only “catch-up” campaign to interrupt virus circulation; “keep-up” vaccination or routine immunization to maintain the interruption of measles virus circulation; and “follow-up” vaccination campaigns among preschoolers to counter the inevitable buildup of measles-susceptible children. In addition, special intensive efforts, known as “mop-up” vaccination, may be required to provide measles vaccine to children living in high-risk areas who have missed vaccination (21). When the PAHO vaccination strategy is fully implemented, virtually all children will receive one dose of measles vaccine, and most will receive more than one dose.

Caribbean and Latin American countries conducted catch-up campaigns between 1989 and 1995, and have been conducting follow-up campaigns since 1994 (6, 19). Additionally, several countries have vaccinated adolescents and adults with measles-rubella (MR) vaccines since 2001, as part of rubella elimination campaigns. Routine coverage has increased from 80% in 1994 to more than 90% since 1999. In 2005, the lowest coverage levels for routine vaccination were reported in Haiti (59%), Venezuela (76%), Bolivia (89%), and Colombia (89%).

A large measles epidemic that affected Venezuela between September 2001 and November 2002 can be viewed as the last instance of widespread endemic transmission of the measles virus in the Americas. This outbreak originated from an importation from Europe. It resulted in 2,501 cases (109 in 2001 and 2,392 in 2002) reported from 17 of the country’s 27 states (Figure 13); only 18% of the confirmed cases had received a measles-containing vaccine (22). The outbreak spread to Colombia, leading to 140 confirmed cases between January and September 2002 (23). The outbreak in Venezuela was controlled thanks to mass vaccination efforts that had solid political commitment.

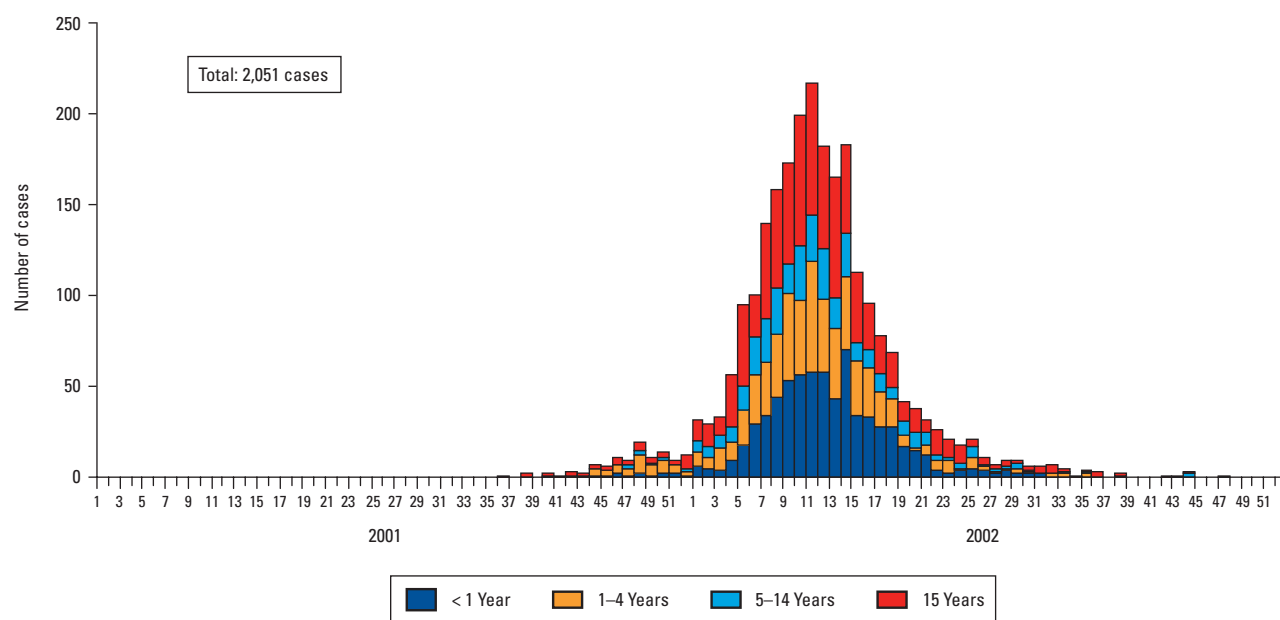
Since 2003, only about 100 cases have been reported in the Americas annually (119 in 2003, 108 in 2004, and 85 in 2005) and most of them can be positively linked to importations from other regions of the world. As of 2006, no other region in the world had interrupted the endemic circulation of the measles virus.

Between 2003 and 2006, the following outbreaks were reported in the Americas (24):

- In 2003–2004, Mexico reported outbreaks totaling 108 cases related to an H1 virus genotype indigenous to the Far East.
- In 2005, Brazil reported an outbreak of six cases linked to an imported case infected in South Asia related to a D5 virus genotype.
- From November 2005 to February 2006, Canada, Mexico, and the United States have reported cases related to a B3 virus genotype, a strain indigenous to Central and West Africa;
- From February to June 2006, Venezuela reported 81 cases, the primary case-patient having a travel history to Spain. The virus isolated from this outbreak was B3, the same genotype circulating in Spain.
- In May 2006, the United States reported an outbreak of 18 cases in Boston related to an imported case likely infected in Southeast Asia.
- In November 2006, Venezuela reported another outbreak that resulted in 12 cases, all residents of the Camaguan municipality, Guarico State. The genotype of the virus isolated was B3.
- Finally, between October and November 2006, the state of Bahia, Brazil, confirmed 57 measles cases. The measles genotype in this outbreak was D4, genetically related to measles that had been imported to Canada this year. The D4 genotype circulates widely in Europe and Africa. The source of this outbreak could not be identified.

Molecular epidemiology of circulating measles viruses has provided a better understanding of measles virus transmission around the world. Transmission of the D6 measles virus genotype—which caused large outbreaks in Argentina, Bolivia, Brazil, the Dominican Republic, and Haiti, starting in 1995—was interrupted in September 2001. Subsequent transmission of the D9 measles virus genotype in Venezuela was interrupted in November 2002 (25). All genotypes identified from outbreaks occurring since 2003 have been nonindigenous to the Americas (26).

Epidemiological surveillance remains critical to maintaining measles elimination in the Americas. The PAHO-recommended measles surveillance strategy, which now is fully integrated with rubella surveillance, encompasses weekly reporting of suspected cases, including zero-case reporting; laboratory confirmation of suspected cases using serology or viral isolation; active case-searches in areas reporting cases and in silent municipalities; measles virus genotyping; and classification of confirmed cases by source of infection as imported, imported-related, or unknown. Periodic active-case finding in institutions also is recommended to monitor the quality of the surveillance system. For the early detection of imported cases, private-sector health facilities that care for tourists and intercontinental travelers should be in-

FIGURE 13. Distribution of confirmed measles cases, by age group and week, Venezuela, 2001–2002.

Source: Graph presented at XVI Meeting of the Technical Advisory Group on Vaccine-preventable Diseases, Mexico City, November 2004.

cluded in the surveillance system, as illustrated by recent outbreaks following importations.

PAHO recommends using standardized measles/rubella surveillance indicators to allow a transparent and uniform monitoring of surveillance data across countries (26). The percentage of cases discarded by negative laboratory results has consistently been over 95% since 2001. The percentage of sites reporting weekly and the percentage of cases with adequate samples have exceeded 80% at the Regional level since 2002, and the percentage of laboratory results released within four days reached 80% in 2004. Nevertheless, the timely submission of samples to the laboratory and the timely reception of results (Regional average <80%) are indicators that have not been consistently met.

Neonatal Tetanus

Ten years after the World Health Assembly called for the global elimination of maternal and neonatal tetanus by 1995, global efforts have been successful in eliminating neonatal tetanus (NNT) in 104 out of 161 developing countries (27). In the Americas, the elimination of neonatal tetanus (NNT) as a public health problem—defined as fewer than 1 case per 1,000 live births in each district or municipality—has been achieved, except in Haiti (17).

PAHO-recommended strategies to eliminate NNT include a high-risk district approach and a strategy to investigate each NNT case in detail and vaccinate all women of childbearing age with at least two doses of tetanus vaccine. It should be noted that PAHO recommends the administration of tetanus and diphtheria toxoid (Td), rather than tetanus toxoid (TT) alone, because Td

provides maintains immunity to both diphtheria and tetanus in adults (28, 29). In the Americas, a single case of NNT is considered a failure of the health services. In order to prevent new cases, therefore, each case should be subject to a thorough evaluation to determine how it could have been averted (26).

Following the implementation of Regional strategies in the 1980s, the number of reported NNT cases in the Americas fell more than 50% in the first four years and has continued to decline in the 1990s and 2000s, registering a 94% decline from 1986 to 2005. Nevertheless, as of 2006, Haiti continued to report close to 50% of the Region's total cases and the country's national average NNT incidence is twice the threshold of 1 per 1,000 live births. NNT incidence in Haiti exceeds that threshold in 10 out of 12 departments, and in one-third of the districts. Furthermore, districts where the incidence is under the threshold in some cases may represent "silent" districts. In Haiti, NNT is ranked sixth among neonatal death causes, accounting for 4% of all neonatal deaths.

Non-neonatal Tetanus

Tetanus cases have declined following the widespread administration of tetanus toxoid to children and to women of childbearing age as part of the effort to prevent neonatal tetanus. Nevertheless, the disease continues to occur in unvaccinated populations that are at risk of wounds and in places where there are *Clostridium tetani* spores; in other words, in rural, poor, livestock-raising areas with populations that do not have adequate health services. More than 7,000 cases of tetanus were reported

in 1980, and fewer than 1,000 non-neonatal tetanus cases have been reported in the Region annually since 2001 (479 in 2001; 387 in 2002; 881 in 2003; 825 in 2004; and 972 in 2005). The vast majority occurred in persons 15 years of age or older, and the male:female ratio is approximately 4–5:1. As vaccinated cohorts reach adulthood and countries provide tetanus booster doses, the incidence of tetanus should continue to decrease.

Pertussis

The number of pertussis cases reported in the Americas has dropped dramatically with the widespread use of pertussis vaccines, decreasing from more than 120,000 cases reported in 1980 to fewer than 35,000 reported in 2005.

In Latin America, pertussis has continued to decline in recent years, dropping from 9,421 cases in 1999, to a low of 4,921 cases in 2003. However, 4,928 cases were reported in 2004 and 6,807 in 2005, and outbreaks continue to occur, some of them drawing significant media attention (30).

In recent years, more than 70% of all pertussis cases reported in the Americas came from the United States. There, pertussis incidence has been gradually increasing since the early 1980s. In 2004, a total of 25,827 cases were reported, the largest number since 1959. In the United States, adolescents (11–18 years old) and adults (20 years old and older) have accounted for an increasing proportion of cases. During 2001–2003, the annual incidence of pertussis among 10–19-year-olds increased from 5.5 per 100,000 in 2001, to 6.7 in 2002, and 10.9 in 2003. In 2004, approximately 60% of cases were among persons 11 years old and older. Increased recognition and diagnosis of pertussis in older age groups have probably contributed to this increase of reported cases among adolescents and adults (31). This shift in the ages of those presenting with the disease led the United States to recommend a booster of pertussis vaccine in adolescents, using a recently licensed vaccine that contains smaller doses of acellular pertussis (32).

There is no information by age group for the Region as a whole. However, a review of the number of pertussis cases reported in selected Latin American countries for which information is available (Chile, El Salvador, Guatemala, Honduras, Panama, Paraguay, and Peru) indicated a downward trend in disease incidence between 2000 and 2004 in children under 1 and in adolescents.

In Latin America and the Caribbean, the main challenges in pertussis control are the standardization of surveillance definitions and improvements in laboratory diagnosis.

Diphtheria

In 1978, before the Expanded Program on Immunization (EPI) was fully implemented, 6,857 diphtheria cases were reported in the Americas. Between 1999 and 2003, approximately 100 cases were reported annually for the entire Region. However, 181 cases were reported in 2004 and 272 in 2005, following a diphtheria out-

break in the Dominican Republic and Haiti. The cases in these two countries accounted for 88% and 92% of the total number of cases in the Americas in 2004 and 2005, respectively (Figure 14).

Since 2000, outbreaks have occurred in Colombia (2000), following a sustained decrease in DTP coverage in the late 1990s after a major reorganization of the health care system (33); in Paraguay (2002), related to low vaccination coverage and delays in case notification and implementation of control measures (34); and in the Dominican Republic and Haiti (2004–2005), affecting mostly low-coverage areas. The case-fatality rate of this last outbreak was as high as 47% in Haiti in 2005 (35).

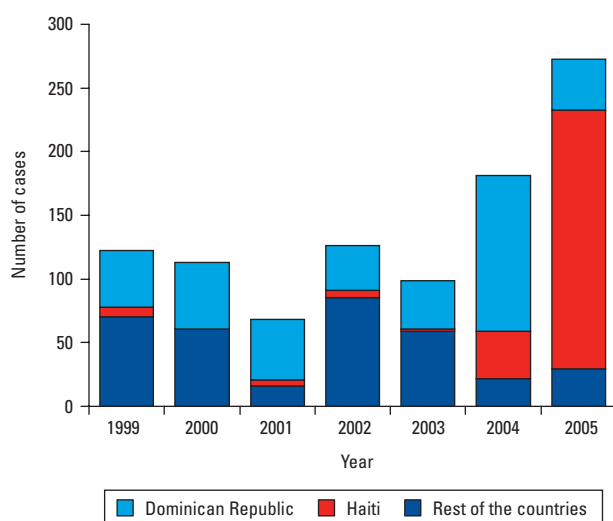
Vaccination is the main strategy to prevent diphtheria. To control outbreaks, the priority is to intensify vaccination through a combination of mass vaccination efforts targeting affected areas and areas with low coverage levels, and the strengthening of routine services for the provision of DTP in infants and booster doses, as DT/Td vaccines, in older children and adults. Strengthening case management, including the early use of diphtheria antitoxin, also should be a priority in high-risk countries (34).

Haemophilus Influenzae Type B

Haemophilus influenzae type b (Hib) is an important cause of bacterial meningitis, pneumonia, and other forms of invasive disease in children aged under 5 years old. Before the introduction of the vaccine, 20,000 cases of Hib disease were estimated to occur in the United States (36) and another 20,000 cases of Hib meningitis were estimated to occur in the Latin America and the Caribbean every year (37). Reported annual incidence rates of Hib meningitis in children under 5 years old ranged from 12.8 per 100,000 in the Dominican Republic to 68.6 in Alaska (U.S.), not including studies in special-risk groups (38–40). Most cases of Hib meningitis in the Americas occurred in children aged under 23 months old, with 60% or more of the cases occurring in children 0–11 months old (38). The annual mortality rate for Hib meningitis in children aged under 5 years old was estimated to be around 2 per 100,000 for the Region (38). However, case-fatality rates and sequelae vary significantly by country, with the lowest rates occurring in industrialized countries.

Since 1997, PAHO has recommended the introduction of Hib vaccine in all countries of the Americas (41). However, Hib vaccine is considerably more expensive than vaccines traditionally included in EPI. Given this, PAHO's Technical Advisory Group on Vaccine-preventable Diseases has emphasized the need to consider sustainability when introducing Hib vaccine into national routine schedules and has recommended purchasing Hib vaccine in combination with DTP or DTP/HepB (as a pentavalent vaccine) through the PAHO Revolving Fund for the Purchase of Vaccines (41).

As of 2006, all of the Region's countries and territories (except Haiti) include Hib vaccine in their childhood immunization schedule: 36 use combination vaccines (32 as pentavalent). Hib-3 coverage Regionwide exceeded 90% in 2004 and 2005. A dramatic

FIGURE 14. Reported diphtheria cases, Region of the Americas, 1999–2005.

Source: Country reports to PAHO, Family and Community Health, Immunizations.

reduction in Hib disease has been demonstrated in those countries of the Region where well-performing Hib surveillance exists. An estimated 85% decrease in Hib meningitis cases has occurred in Latin America and the Caribbean, based on coverage levels achieved, 95% vaccine effectiveness, and the 20,000 cases estimated in the pre-vaccine era (42).

Hepatitis B

Routine universal infant vaccination against hepatitis B is the main strategy for the control of hepatitis B and its severe consequences. In addition to infant vaccination, PAHO recommends routinely vaccinating health care workers (43). The decision to add a dose at birth is based on the prevalence of carriers in the general population—recommended when the hepatitis B virus seroprevalence exceeds 8%—and on the country's resources (44). The endemicity of hepatitis B virus infection in the Americas varies from low to intermediate; the highest prevalence rates are in the Amazon basin, at 8%, and the lowest in the southern portion of South America (45–49).

The introduction of hepatitis B vaccine into childhood immunization schedules in the Americas has been progressive, with most countries having introduced the vaccine between 1997 and 2000 (44). As of 2006, all countries of the Americas, except Haiti, included hepatitis B in their infant immunization schedule, and 13 countries/territories included a hepatitis B dose at birth. Coverage levels for the third dose of hepatitis B vaccine have been higher than 90% at the Regional level since 2004, and are generally higher than 80% in the countries. However, hepatitis B vaccine coverage overall is lower than that for the third dose of DTP in countries that were not using them in combination. At this

writing, information is insufficient to assess the use of hepatitis B vaccine in health care workers in the Americas.

Moving from Child to Family Immunization

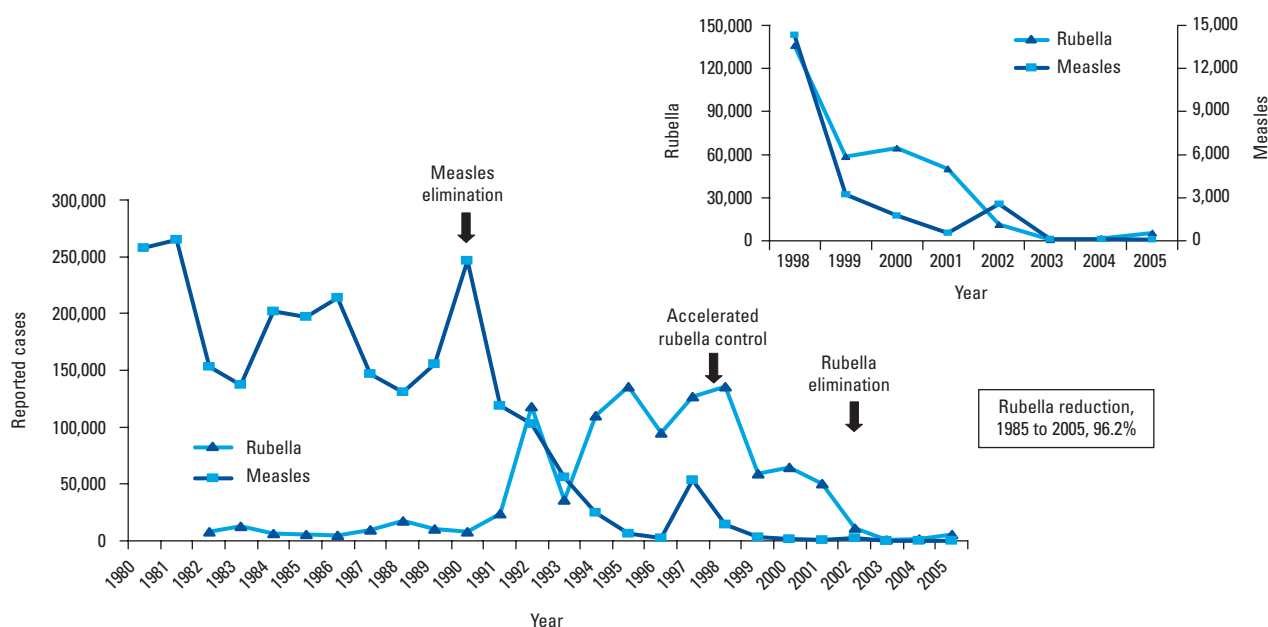
Immunization programs in the Americas are rapidly shifting from targeting children exclusively to including the entire family. The rubella elimination strategy (discussed below) has led to the vaccination of more than 76 million adolescent and adult men and women against rubella and measles. In recent years, countries have accelerated the introduction of seasonal influenza vaccine into routine schedules for adult populations at risk. Finally, the recent licensure of safe and effective vaccines against human papillomavirus has made the determination of the burden of cervical cancer an urgent matter. The many lessons learned from vaccinating adults in the Americas will serve as a model for other Regions of the world, and will also serve as the basis for developing HIV immunization strategies, once a vaccine against that virus becomes available (50).

The Unfinished Immunization Agenda

Elimination of Rubella and Congenital Rubella Syndrome

In 2003, the Region of the Americas embarked on an effort to eliminate rubella and congenital rubella syndrome (CRS) by 2010. The elimination of rubella and CRS in the Americas has been defined as the successful interruption of the endemic transmission of rubella in all the countries, without the occurrence of CRS cases associated with endemic transmission.

The rubella elimination initiative came when surveillance carried out as part of measles elimination clearly highlighted how significant a public health problem rubella and CRS were for the Western Hemisphere (Figure 15). Moreover, most rubella outbreaks and CRS cases in the United States in the late 1990s occurred in persons of Hispanic background (51). Based on available epidemiological data, it was estimated that in non-epidemic years, approximately 20,000 children were born with CRS in the Region each year (52). Furthermore, economic analyses in the Caribbean determined that the cost to care for a child with CRS throughout the child's life was between US\$ 50,000 and US\$ 63,900 (not accounting for indirect and social costs), and that mass campaigns were highly cost-beneficial and cost-effective (53). In light of these data, and of the significant experience in the reduction of rubella in Cuba and the English-speaking Caribbean through enhanced childhood rubella vaccination and mass vaccination campaigns targeting adults, PAHO's Technical Advisory Group on Vaccine-preventable Diseases recommended the accelerated control of rubella in 1997 (41). The Caribbean Community (CARICOM), comprising the English-speaking Caribbean countries and Suriname, went one step further by setting a goal to eliminate rubella and prevent the occurrence of CRS cases in its Member States by 2000 (54).

FIGURE 15. Impact of rubella and measles elimination strategies, Region of the Americas, 1980–2005.

Source: Country reports to PAHO, Family and Community Health, Immunizations.

The main strategies recommended for rubella and CRS elimination in the Americas, based on knowledge about the disease, the vaccine, and rubella control experiences, are as follows (55):

- Introducing the rubella vaccine in routine immunization schedules and reaching vaccination coverage of more than 95% in the target population in each municipality.
- Implementing a one-time mass vaccination campaign of men and women in all countries with endemic transmission, in order to significantly reduce the time to interrupt rubella virus circulation and rapidly prevent the occurrence of CRS.
- Continuing to use the measles-rubella vaccine in “follow-up” campaigns for measles elimination.
- Integrating rubella surveillance into the epidemiological surveillance system used for measles elimination.
- Implementing CRS surveillance.
- Strengthening the laboratory diagnosis of rubella and CRS, as well as viral isolation.

As of 2005, approximately 99% of new birth cohorts in the Americas have access to the combination measles, mumps, and rubella (MMR) vaccine. Only Haiti has yet to include the vaccine in its vaccination schedule. In 2002, all the Region's countries had conducted “follow-up” campaigns for children under 5 years old using the measles-rubella (MR) vaccine, and had achieved over 90% coverage. Before the Regional elimination resolution, Chile

in 1999 and Brazil in 2001–2002 conducted mass rubella campaigns targeting only women, aiming to prevent CRS. Additionally, from 1998 to December 2005, the English-speaking Caribbean, Colombia, Costa Rica, Ecuador, El Salvador, Honduras, Nicaragua, and Paraguay conducted adult vaccination campaigns targeting men and women, in most cases reaching coverage levels higher than 95%. Venezuela conducted the first stage of its campaign in June 2005, vaccinating persons younger than 17 years old. Countries such as Canada, Cuba, Panama, the United States, and Uruguay have included the rubella vaccine in their childhood immunization schedules and have reached high coverage levels for several years. In the United States endemic rubella virus transmission has been declared eliminated (56). To reach the Regional elimination goal, the remaining countries plan to conduct vaccination campaigns between 2006 and 2008.

All countries have integrated rubella and measles surveillance, although it still needs strengthening. As of 2005, some countries continued to report rubella cases that were not included in the measles/ rubella surveillance system, and, therefore, were not properly investigated.

Since the rubella vaccine was introduced and vaccination campaigns were carried out, rubella incidence declined 96%, from 135,000 reported cases in 1998 to 5,296 cases in 2005 (57). In 2005, 88% of all rubella cases reported in the Region came from countries that had not yet launched campaigns. No cases were reported from countries after they conducted mass vaccination campaigns targeting adult men and women. Rubella out-

breaks in Canada and Chile (among institutionalized men) in 2005, and continued transmission of rubella and occurrence of CRS cases in Brazil highlight the need to include men in vaccination strategies in order to interrupt rubella virus transmission in the Americas.

The number of countries and territories in the Americas that conduct CRS surveillance has increased from 13% (18 countries) in 1998 to 100% since 2003. In 2005, countries started reporting suspected CRS cases on a weekly basis. Between 2001 and 2003, 79 CRS cases were reported, 27 in 2004 and 20 in 2005. Nevertheless, CRS surveillance is still not complete. Of the 1,952 suspected cases reported in 2005, 99% came from only six countries (Brazil, Chile, Colombia, El Salvador, Honduras, and Peru). Argentina, Brazil, Costa Rica, the Dominican Republic, El Salvador, and Peru also have conducted retrospective studies in children's and obstetric hospitals, schools for the deaf and blind, and the community to identify children with CRS; these studies allowed for the identification of many more probable or confirmed CRS cases among infants. The lessons learned in CRS surveillance in the Americas will certainly help define good public health practices for establishing CRS surveillance and detecting suspected cases at the primary care level with the involvement of specialists (58).

An area that needs more attention is the detection and isolation of rubella virus from cases of rubella and CRS reported from countries of the Americas. Viral isolation and molecular typing is critical to help determine the source of infection and rubella virus variations. Phylogenetic studies of rubella viruses have shown two virus clades and seven genotypes. In the Americas, the 1C rubella virus has been identified as endemic. Clade 2 viruses have not been found circulating in the Region (59).

Implementing the rubella elimination strategy helps to consolidate the elimination of measles in the Region, greatly contributes to the reduction of inequities in maternal health outcomes, strengthens the political commitment for immunization services, and promotes a culture of prevention (50, 60). CRS surveillance can reinforce the health services' diagnostic capacity to promptly detect and treat infant disabilities. In addition to CRS prevention, women's health care can be further improved by the strengthening of adult health services, staff education, improvements in epidemiological surveillance, decentralization of decision-making, better program management, enhanced health awareness, and community participation that result from the implementation of the strategy (17, 50, 60).

Reaching the Underserved

Immunization's umbrella of protection does not yet extend to all children and at-risk women in the Region. Even though national coverage levels are high, much disparity exists among municipalities within countries, reflecting vast inequities. In Latin America and the Caribbean in 2005, 39% of the more than 15,000 municipalities or districts had not reached the Regional goal of 95% coverage with DTP-3 (61, 62). Furthermore, approximately

“The population in some countries still suffers such epidemic diseases as typhoid, smallpox, plague, malaria, and dysentery; child mortality is excessive, nutrition inadequate, modern hospitals practically nonexistent and average life expectancy low.”

Fred Lowe Soper, 1951

one child in three in Latin America and the Caribbean lives in a district where coverage with DTP-3 does not reach 80% (63). Completing the unfinished agenda for immunization requires that these unreached children and their families have equitable access to the benefits of immunization. Identifying municipalities at risk and targeting them for focused interventions remains critical.

Vaccination Week in the Americas

Vaccination Week in the Americas is a Regionwide effort that aims to reach the unreached, strengthen the regular immunization program, and foster political commitment to immunization. This initiative, originally proposed by the Ministers of Health of the Andean Region and then endorsed by the Directing Council of the Pan American Health Organization (64), is based on the principles of equity, access, and Pan-Americanism. This annual hemispheric event, held every April, allows countries to target high-risk population groups and underserved areas, gather political support for disease elimination and control, and promote Regional and cross-border coordination.

In 2003, 19 countries and territories participated in the Vaccination Week in the Americas and over 16 million persons were vaccinated. The number of countries and territories participating increased to 35 and 36 in 2004 and 2005, respectively. The number of persons vaccinated during the Week reached 43.7 million in 2004. In 2005, five countries reported having vaccinated over 48,000 children aged 1 to 4 years who had never received a dose of DTP or pentavalent before. Colombia, Guatemala, Honduras, Mexico, and Panama reported vaccinating more than 539,000 women of childbearing age who had not received a previous dose of Td (17).

Besides vaccinating vulnerable populations, countries have used the Vaccination Week in the Americas to introduce new vaccines; conduct rubella-measles campaigns; launch immunization awareness campaigns among health workers and in the community; and provide other health interventions such as vitamin A supplementation, distribute antiparasitic drugs and instructions on preparing oral rehydration solution, conduct eye examinations, and provide health education. The political commitment from national authorities and public health stakeholders with immunization during the event has been illustrated by 30 cross-border launchings and the participation of five presidents; four first ladies;

and ministers of health, local authorities, representatives from international organizations, and other immunization partners.

Following the example from countries of the Americas, and using the lessons learned there, WHO's European Region launched its First Annual European Vaccination Week in October 2005.

Yellow Fever

Yellow fever remains a serious public health problem in several tropical areas in the Americas. Although yellow fever vaccine 17D, considered to be a safe and effective vaccine, has been available since the 1930s, the disease is yet to be adequately controlled. Occasional cases of jungle yellow fever, the occurrence of outbreaks, and the proliferation of *Aedes aegypti* across the Region are evidence of the continued risk of the reurbanization of the disease.

Cases of jungle yellow fever are confined to areas of South America, including Bolivia, Brazil's east-central region, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname, and Venezuela, and to Trinidad and Tobago in the Caribbean. Panama has enzootic areas, but has not reported cases in several decades. No urban cases of yellow fever have been reported since 1942.

The epidemiology of yellow fever infection has cyclical characteristics—there have been three major epidemic spikes since 1994. The highest number of cases was recorded in 1995, resulting from a major outbreak in the western Andean region of Peru. Between 2001 and 2005, 662 cases and 315 deaths were reported, which is a reduction of almost half compared to the figures for 1995–2000. In 2003, there was an increase in yellow fever incidence due to outbreaks in Colombia (112 cases), Brazil (64 cases), Venezuela (34 cases), and Peru (26 cases). Limited outbreaks and isolated cases were reported between 2004 and 2005. Cases continue to occur mostly among young adults 15–40 years old, predominantly in males. Migrants to enzootic areas also are a vulnerable group.

National plans of action have included vaccinating all residents of enzootic areas and travelers to those areas; strengthening syndromic jaundice-fever surveillance and epizootic surveillance (appearance of the disease or death in monkeys in jungle areas); and promptly responding to outbreaks. Additionally, Bolivia, Colombia, French Guiana, Guyana, Peru, Trinidad and Tobago, and Venezuela, seven of the eleven countries or territories with enzootic areas, have introduced yellow fever vaccine for all children 1 year old at the national level. In six of those seven, coverage rates are comparable to those achieved for MMR vaccine.

New Challenges in Immunization

Using immunization to its full potential is critical to attain global targets of mortality reduction and development. The Global Immunization Vision and Strategy (GIVS) developed by WHO and the United Nations Children's Fund (UNICEF), calls for

a two-thirds reduction in mortality from vaccine-preventable diseases by 2015 as compared with 2000 levels. GIVS is a major global policy aimed at “protecting more people against more diseases by expanding the reach of immunization to every eligible person, including those in age groups beyond infancy” (65). In addition to improving vaccination coverage levels, particularly in low-coverage districts, other proven public health interventions need to be integrated with immunization strategies and new and under-utilized vaccines targeting priority diseases need to be introduced into routine immunization programs. Examples of integration of immunization with other public health interventions are delivery of antihelminthics during Vaccine Week in the Americas; vitamin A supplementation; integration of CRS surveillance with perinatal and infant programs; implementation of rotavirus surveillance in the context of childhood diarrhea surveillance and the integrated management of childhood illness (IMCI) strategies; pneumococcus surveillance in the context of other bacterial invasive diseases in children and IMCI; and human papillomavirus vaccination initiatives integrated to secondary screening, adolescent health programs, and cancer monitoring.

New and Under-utilized Vaccines

Several new vaccines against killer diseases are either available or in the pipeline; the decision whether to introduce them or not, more than ever needs to be supported by local evidence. Because these new-generation vaccines are much more expensive than traditional ones, they create new sustainability challenges for immunization programs.

Previous experiences with the introduction of vaccines such as MMR, Hib, and pentavalent in countries of the Americas has made it clear that before a vaccine is introduced, the following factors must be considered: disease burden, the definition of at-risk groups, cost-effectiveness studies, vaccine availability, possible adverse events attributable to the new vaccine, the vaccine's impact on the national budget and on the cold chain infrastructure, effects on the country's immunization schedule, adequacy of surveillance, political commitment, competing health priorities, opportunity costs, and financial sustainability (7, 26). Strengthening national regulatory authorities to evaluate new vaccines that may not be licensed in their country of origin and improving the monitoring of adverse events after the vaccine has gone on the market are also important areas of work in Latin America and the Caribbean.

In consideration of the above-mentioned factors regarding vaccine introduction, an analysis of new and under-utilized vaccines available in the pipeline shows that vaccines against influenza, rotavirus, pneumococcus, and human papillomavirus should be considered as priorities in the Region of the Americas.

Influenza

Influenza is a viral disease that strikes millions of people worldwide and causes fatal complications in approximately one

million people every year (66). Even though the burden of influenza in Latin America and the Caribbean has not been well-documented, studies from selected countries suggest that seasonal influenza is a major cause of morbidity and mortality associated with respiratory infections, mainly in older adults and young children (67, 68). Many of these cases and deaths can be avoided through the use of safe, highly effective vaccines. Influenza vaccine administered seasonally has been considered as perhaps the most under-utilized vaccine in the Region (17).

Since 2000, the Region's countries have made significant progress in increasing influenza vaccination coverage in the population 60 years old and older, chronically ill individuals, immunocompromised persons, health professionals, and pregnant women. Of the 39 Latin-American and Caribbean countries and territories that responded to a survey of national immunization program managers aimed to determine the status of influenza vaccination in the Region by the end of 2005, 19 reported having public policies for influenza vaccination (Anguilla, Argentina, Bahamas, Bermuda, Brazil, British Virgin Islands, Cayman Islands, Chile, Colombia, Costa Rica, Cuba, El Salvador, French Guiana, Honduras, Mexico, Netherlands Antilles, Panama, Paraguay, and Uruguay). Of these, 84% vaccinate health workers and 16% immunize persons who come in contact with birds. In many of the other countries, influenza vaccine is only available through the private sector. The routine immunization of children younger than 23 months old has been introduced in Bahamas, Bermuda, Cayman Islands, Colombia, El Salvador, Mexico, Panama, and Uruguay; Chile, Costa Rica, and Honduras vaccinate children under 5 years old who suffer from high-risk conditions. The United States has been using influenza vaccine since the 1970s; in 2006, the country expanded its recommendation to include all children up to 5 years of age (69). This represents marked progress compared to 2001, when only nine Latin American and Caribbean countries reported including influenza in their routine schedule.

Countries need to implement or strengthen their epidemiological surveillance for influenza. Although 84% of the respondent countries report having a routine surveillance system for influenza, the countries or territories surveyed do not have consistent or complete information on viral circulation patterns. Surveillance data are key in determining the burden of influenza, the cost-effectiveness ratio of introducing influenza immunization, and in deciding the best vaccination strategy, particularly in tropical areas. It also is necessary to generate vaccination coverage data in all target groups in order to evaluate program effectiveness and impact.

There is a limited global production capacity for influenza vaccine, and countries have faced vaccine shortages, mainly vaccine formulated in the Northern Hemisphere. Strategic partnerships with manufacturers and technology transfer to Latin American countries such as Argentina, Brazil, and Mexico will be critical for ensuring adequate vaccine supply. Also, the demand

created by administering influenza vaccine seasonally may increase the likelihood that a supply of pandemic vaccine will be available for the Region's countries.

Rotavirus

Rotavirus is one of the most common causes of severe diarrhea worldwide. It accounts for approximately 40% of diarrhea hospitalization in children aged under 5 years old and for more than 600,000 estimated deaths per year. Even though rotavirus affects children in both developed and developing countries, 82% of all rotavirus deaths occur in developing countries (70). Disease burden estimates indicate that rotavirus diarrhea constitutes an important public health problem in most of the Region's countries, causing more than 15,000 deaths and an estimated 75,000 hospitalizations each year (70).

In 2006, two rotavirus vaccines entered the market. Results from clinical trials indicate that both are safe and effective in preventing severe rotavirus diarrhea (71). None of these vaccines have been associated with an increased risk of intussusception, the adverse event that led to the withdrawal of an early rhesus-based tetravalent rotavirus vaccine from the market in 1999 (71–73).

In July 2004, representatives of ministries of health of countries of the Americas called upon PAHO and the PAHO Revolving Fund for the Purchase of Vaccines to facilitate the introduction of vaccines against rotavirus at prices accessible to all the Region's countries as soon as a vaccine becomes available (74). In preparation for vaccine introduction, significant progress has been made in implementing hospital-based surveillance in the Region. As of July 2006, Bolivia, El Salvador, Guatemala, Guyana, Honduras, Paraguay, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, and Venezuela had implemented surveillance using standardized case definitions and protocols, and routinely reporting to PAHO. Of the suspected cases, almost 40% were positive for rotavirus in 2005 and almost 52% were positive in 2006 (preliminary data as of May 2006) (Table 9). The seasonality of rotavirus infection has become evident in most countries, with incidence peaks during winter months. The predominant genotype in the Region is P[8]. The G9 serotype seems to be emerging, and the similar frequency of the G3 and G9 serotypes may indicate that G9 is replacing G3 (75–78). These findings again emphasize the importance of continued strain surveillance in the Region, since it can provide important insights for adjusting the next-generation vaccine composition.

In the first half of 2006, Brazil, Panama, Venezuela, and priority areas in Mexico began using rotavirus vaccine for infants 2–4 months old. That year, the United States also reintroduced its recommendation for the routine use of rotavirus vaccine in its childhood immunization schedule in 2006 (62).

Pneumococcus

Worldwide, pneumonia is the leading cause of death in children, ranking higher than HIV, tuberculosis, or malaria (79, 80).

TABLE 9. Data and indicators of rotavirus hospital-based sentinel surveillance, reporting countries, Region of the Americas, 2005.

INDICATORS	Bolivia Nov-Dec	CAREC ^a Jan-Dec	El Salvador Jan-Dec	Guatemala Jan-Dec	Honduras Jan-Dec	Paraguay Jan-Dec	Venezuela ^b Jan-Nov	TOTAL
Number of hospitalizations in children under 5 years old	1,826.0	388	15,275	18,568	37,127	2,281	1,279	76,744
Number of hospitalizations due to diarrhea in children under 5 years old	326.0	214	3,105	2,502	2,420	326	200	9,093
% of hospitalizations due to diarrhea in children under 5 years old	17.9	55.2	20.3	13.5	6.5	14.3	15.6	11.9
Number of children under 5 years old that meet the case definition	180.0	150	1,109	1,391	1,133	223	598	4,784
% of suspect rotavirus cases	55.2	70.1	35.7	55.6	46.8	68.4	...	52.6
Number of children with complete form and stool sample collected	173.0	46	388	1,035	587	196	598	3,023
% of suspect cases with form and stool sample collected	96.1	30.7	35.0	74.4	51.8	87.9	100.0	63.2
Number of cases with positive results for rotavirus	31.0	14	106	616	78	106	254	1,205
% of confirmed rotavirus cases	17.9	30.4	27.3	59.5	13.3	54.1	42.5	39.9

^aThe four countries reporting rotavirus data to the Caribbean Epidemiology Center (CAREC) are Guyana, Saint Vincent and the Grenadines, Suriname, and Trinidad and Tobago.

^bDoes not include data for number of total hospitalizations for diarrhea from three hospitals.

Source: Country reports to the rotavirus database, PAHO, Family and Community Health, Immunizations.

Streptococcus pneumoniae, or pneumococcus, causes an estimated 1.6 million deaths, 800,000 of which occur in children (81). The rates of invasive disease are highest in children aged younger than 2 years old, but disease continues to occur in other age groups, particularly among the elderly. In industrialized countries, the disease has the highest mortality rate among the elderly.

Data obtained from the Regional Vaccine System (SIREVA), a network for the surveillance of pneumococcus established in 1993, indicate that the circulating serotypes in the Americas have not changed significantly in the six participating countries between 1993–1999 and 2000–2003. Serotype 14 was the leading serotype isolated in most countries (80).

Since 2000, a conjugated 7-valent vaccine has been available to prevent invasive pneumococcal disease in infants. In 2005, this vaccine was only routinely being used in Bermuda, Canada, and the United States. Chile and Panama have introduced it for children with immune disorders and other chronic pathologies. In addition, 9-valent and 11-valent vaccines are being evaluated, and it is expected that they will become available in the near future. Based on serotype data from SIREVA, the 7-valent vaccine would cover 59%, 9-valent would cover 71%, and 11-valent would cover 77% of the serotypes circulating in Latin America (80).

In preparation for pneumococcus vaccine introduction, PAHO is working with the countries to expand surveillance of invasive bacterial diseases and conduct population-based epidemiological studies in the Region (80). In addition to conducting epidemiological studies, countries are preparing to evaluate the economic implications of introducing pneumococcus vaccine. The vaccine's cost, at US\$ 53 per dose purchased through the Revolving Fund in 2006, has been the main limitation preventing the vaccine's introduction.

Human Papillomavirus

Cervical cancer persists as a significant public health problem in Latin America and the Caribbean, despite the long-standing availability and application of secondary prevention through Papanicolaou (PAP) smear cytology. Every year, 86,532 new cases of cervical cancer and 38,435 deaths occur among women in the Americas, with Latin America accounting for 71,862 deaths and the Caribbean, for 32,639 deaths annually (82). In addition to these cases of invasive cervical cancer, women with low- and high-grade precancerous cervical lesions (dysplasias and carcinoma *in-situ*) also contribute to the disease burden and to the high costs associated with screening, diagnosis, and treatment of this disease.

Two prophylactic recombinant human papillomavirus (HPV) vaccines, one bivalent (16 and 18 virus-like types) and the other tetravalent (16, 18, 6, and 11 virus-like types) have been developed. Both vaccines have shown excellent results in terms of their immunogenicity, safety, and efficacy in preventing incident and persistent HPV infections, as well as cervical cancer precursor le-

sions (cervical intraepithelial neoplasia) (83–85). The tetravalent vaccine has also been shown to be efficacious against genital warts (*condyloma acuminata*) and vulvar and vaginal intraepithelial neoplasias (86). The tetravalent vaccine was licensed in its country of origin in 2006, for use in women 9–26 years old.

HPV vaccination complements secondary cervical cancer prevention efforts. PAHO is advocating and supporting the conduct of economic impact and cost-effectiveness studies related to cervical cancer and HPV vaccines in Member States, so that countries will have good data and information for rational public health decision-making regarding the feasible and sustainable introduction of this vaccine (17).

Ensuring Program Sustainability in the Context of New Vaccine Introduction

To hold on to achievements, address the unfinished immunization agenda, and introduce new vaccines, countries of the Americas will require substantial additional financing for their national immunization programs.

In 2005, only three Latin American countries reported financing less than 95% of their routine vaccines using government funds. In most countries (21 of 24 with data available) at least 90% of the national immunization program recurring costs were financed using government funds. All Latin American and Caribbean countries (except Haiti) reported having a budget line for purchase of vaccines (in two Caribbean countries vaccines are included in the budget line for purchase of all medications) (62). It should be said, however, that the existence of a budget line does not always secure the necessary funds for vaccines or the immunization program.

As several new vaccines are rapidly becoming available, it is critical that decision-making on new vaccine introduction be based on the best evidence, in order to be able to prioritize interventions. If these new vaccines are to contribute to overall prevention effectiveness in a sustainable way, economic evidence must be considered along with the usual epidemiologic, demographic, and management data. National committees on immunization practices should participate fully in this assessment process. In order to strengthen immunization program capabilities to gather evidence and set priorities for these new technologies, PAHO has launched the Pro-Vac Initiative. This initiative encompasses multiple country-level training, data collection, and development of economic analysis steps in the context of new vaccine introduction. It is anticipated that this will generate greater demand for, and promote the informed use of, relevant economic studies to support policy-making at country and regional levels (17).

New approaches to sustainable financing are currently being explored, focusing on securing longer-term and reliable funding flows for immunization programs, mainly through the creation of fiscal opportunities. A fiscal opportunity is the flexibility in a national budget that allows for the provision of resources without jeopardizing overall financial sustainability or economic stability.

Specific strategies to create fiscal space include re-prioritizing expenditures for immunization, increasing efficiency and transparency, improving the efficiency of tax collection, and increasing indirect taxes on products that cause significant public health problems, such as tobacco, alcohol, and firearms. Additional strategies include developing new sources of revenue, such as proceeds of national lotteries, and increasing external support (87).

Strengthening vaccine legislation can reduce a country's costs associated with the procurement of vaccines and immunization supplies. Legislation also contributes to reliable and effective program financing and the creation of fiscal opportunities for immunization. Legislation can also contribute to secure the necessary funds for the functioning of strong and sustainable immunization programs (88).

Finally, with new-generation vaccines already available, Pan-American cooperation through the Revolving Fund will enable the Region to continue its spectacular immunization achievements and maximize the Fund's benefits to the countries. As of 2006, 37 countries were making regular use of the Revolving Fund to procure up to 45 different vaccine products. The Fund is streamlining its integrated services to countries by further reducing costs of vaccine procurement, holding, distribution, and use along the supply chain. At the close of 2005, the Revolving Fund was capitalized at just over US\$ 34 million and total expenditures exceeded US\$ 154 million that year. The Revolving Fund, as a highly efficient procurement agency, is positioned to continue its strategic role in strengthening the sustainability of national immunization programs throughout the Region.

VECTOR-BORNE DISEASES

Malaria

The highest number of malaria cases reported in the Region since records have been kept was 1.3 million, recorded in 1995 and 1998 (Table 10) (89). Since that last year, the total number of cases has continued to decline, with 882,361 cases reported in 2004. This figure represents a 23% decrease from the 1.15 million cases reported in 2000, when countries of the Region officially adopted the Roll Back Malaria Initiative (90, 91).

Despite the reduction in morbidity, very little change has been seen in the age distribution of cases. Annual reports from 2002 to 2004 indicate that 63%–64% of cases occur in persons older than 15 years old; 20%–24% occur in persons 5–15 years old; and 11%–12% occur in children under age 5. Fewer than 5% occur in undetermined age groups or among persons older than 59 years old. During the same period, the proportion of males among persons suffering from malaria rose from 54% to 62% (92). These figures continue to highlight the economic impact of the disease, as it afflicts people in the most productive years of their lives.

Brazil consistently accounts for the majority of the cases, with 52.6% of total cases in the Region in 2004. Other countries that

account for considerable proportions of the total number of cases in the Americas include Colombia (13.3%), Peru (10.6%), Venezuela (5.3%), Guatemala (3.3%), Guyana (3.3%), Ecuador (3.3%), and Honduras (1.8%). Collectively, countries that share the Amazon rainforest (Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname, and Venezuela) reported 91% of all cases in 2004. Meso-America, which here refers to Mexico, Central America (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama), the Dominican Republic, and Haiti, accounts for almost 9%. In 2004, 1,263 cases were reported in a number of countries in the Region that had previously been declared as transmission-free for malaria. All these cases were imported from endemic countries within and outside the Americas (92).

While less than one million cases are currently reported in the Americas, 264 million people, or 30% of the Region's population, live in areas where the disease is transmitted, 41.5 million of whom are in areas of high (more than 10 cases per 1,000 population) and moderate (1 to 10 cases per 1,000 population) transmission risk. It is estimated that 94% of cases occur in these areas (90, 91).

At present, malaria is endemic in 21 countries (93), but Argentina, El Salvador, Mexico, and Paraguay are likely to eliminate malaria in the next few years. Belize, Costa Rica, Nicaragua, and Panama also are considered malaria-endemic.

The annual parasitic index in all risk areas is 3.35 per 1,000. For populations living in moderate- and high-risk areas, the index more than triples, at 10.8 per 1,000 (93). Countries with the highest indices in the reporting period were Colombia, French Guiana, Guyana, Suriname, and Venezuela. Most cases in the Americas are caused by *Plasmodium vivax* (74%); 25.6% of cases are caused by *P. falciparum*, and there are very few reported cases caused by *P. malariae* (<0.4%), most of which occur in Suriname (89, 92).

Trends in the distribution of cases by parasite species in the countries varied very little from 2000 to 2004. In Brazil, 76.2% of the cases were caused by *P. vivax*, while 22.7% were due to *P. falciparum*. Bolivia, Colombia, Ecuador, Peru, and Venezuela in the Andean Area follow a similar trend, with 75% of cases caused by *P. vivax* and 25% by *P. falciparum*. Cases in Argentina and Paraguay in the Southern Cone are almost always due to *P. vivax*, with very few exceptions. From 2000 to 2004, French Guiana, Guyana, and Suriname—the countries that make up the Guyana Shield—had a decrease in the proportion of *P. falciparum* cases (65% to 54%) and an increase in *P. vivax* cases (35% to 43%). Mexico and the Central American countries reported that 94% of the cases were due to *P. vivax* and 6%, to *P. falciparum*. In Haiti and the Dominican Republic, the only Caribbean countries where the disease is transmitted, *P. falciparum* is essentially responsible for all cases (89, 92).

Mortality from malaria in the Region is associated with the pathogenesis of *P. falciparum*. Mortality decreased by 55% be-

TABLE 10. Malaria morbidity, Region of the Americas, 1994–2004.

Year	Population (in thousands)		Blood slides			Case detection (per 100,000 inhabitants)	
	Total for the countries	Risk areas ^a	Examined	Positive	Slide positivity rate	Total for the Americas	Malarious areas
1994	763,305	231,323	8,261,090	1,114,147	13.49	145.96	481.64
1995	774,712	248,978	9,022,226	1,302,791	14.44	168.16	523.26
1996	786,055	298,128	8,601,272	1,139,776	13.25	145.00	382.31
1997	793,582	306,521	9,037,999	1,075,445	11.90	135.52	350.86
1998	803,546	308,323	9,148,633	1,289,741	14.10	160.51	418.31
1999	818,273	298,453	10,174,427	1,207,479	11.87	147.56	404.58
2000	832,863	293,196	10,210,730	1,140,329	11.17	136.92	388.93
2001	835,814	293,560	9,456,093	960,792	10.16	114.95	327.29
2002	849,361	262,382	7,785,398	884,744	11.36	104.17	337.20
2003	858,563	302,981	6,980,597	909,788	13.03	105.97	300.28
2004	867,142	264,139	6,980,789	882,361	12.64	101.76	334.05

^aPopulation in areas of the Americas ecologically favorable for transmission; includes areas without active transmission.

Source: Pan American Health Organization. Epi-Data: Status of Malaria Tables, 1994–2004. [Online]. 2006 [cited 2006 July 20]. Available from: <http://www.paho.org/english/ad/dpc/cd/mal-status-2004.pdf>.

tween 2000 and 2004, from 348 deaths to 56 (90, 91). Annual reports from the countries for the last three years of the above-mentioned period reflect a consistently increasing proportion of cases among the population older than 15 years old, from 74.3% in 2002 to 85.1% in 2004. Deaths among children under 5 years old, on the other hand, decreased from 8.8% in 2002 to 4.6% in 2004. More deaths were recorded among males (67% and 74%) than females (33% and 26%) (92).

Passive case detection (diagnostic examination performed in general health services and hospitals or by volunteer collaborators only on patients with clinical symptoms) is used more widely in the Region, except in Argentina, Costa Rica, the Dominican Republic, Panama, and Paraguay, which rely more on active case detection (diagnostic examinations performed for screening, epidemiologic investigations, and follow-up purposes). The proportion of passive case detection use in the Region between 1998 and 2004 ranged from 68% to 81%. To date, official data on access and availability of case detection modalities is limited, but microscopy is known to still be most widely used (89–91).

Aminoquinolines remain the most widely used anti-malarial medication in the Region. *P. falciparum*, the most pathogenic of the malaria parasites, is now known worldwide to be capable of developing resistance to anti-malarials. The phenomenon, which was first reported in Colombia in 1958, continues to be one of the greatest challenges in the global battle against the disease. In the Americas, resistance has only been suspected or confirmed in countries that share the Amazon rainforest (89–91).

At least eight different species of *Anopheles* mosquitoes are considered significant vectors for malaria in the Region. *Anopheles al-bimanus* is found in Belize, Colombia, Costa Rica, the Dominican

Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, and Peru; *A. albicans* is found in Brazil; *A. aquasalis*, in Venezuela; *A. benarrochi*, in Peru; *A. darlingi*, in Belize, Bolivia, Brazil, Colombia, French Guiana, Guatemala, Guayana, Honduras, Paraguay, Peru, Suriname, and Venezuela; *A. marajoara*, in Venezuela; *A. pseudopunctipennis*, in Argentina, Bolivia, Guatemala, Mexico, and Peru; and *A. vestitipennis*, in Belize, Guatemala, and Mexico. As of 2004, most of the 21 endemic countries include a malaria vector control component in their national programs, but reports or information on these components' effectiveness and efficiency are few (89–91).

The most commonly used insecticides in the Americas are organophosphates and pyrethroids. No country reports the use of the organochlorine DDT, which is among the insecticides recommended by the WHO Pesticide Evaluation Scheme (WHOPES) for indoor residual spraying against malaria vectors (94). Several countries also rely on fogging, principally to reduce *Aedes aegypti*, but also to decrease anopheline densities. Mexico and the Central American countries also engage in environmental management activities, use biologic control options, and enlist the community's participation in reducing vector breeding sites through the Regional Action Program and Demonstration of Sustainable Alternatives for Malaria Vector Control without Using DDT (Global Environment Facility – DDT Project) (89–91).

Current Strategies and Program Impact

Since the Global Malaria Control Strategy was adopted in 1992, the 21 countries of the Americas with active malaria transmission applied, in varying degrees, the four technical elements of the strategy in their national programs: early diagnosis and prompt treatment; planning and implementation of selective and

sustainable preventive measures, including vector control; early detection, containment, and prevention of epidemics; and strengthening of local capacities in basic and applied research to permit and promote the regular assessment of a country's malaria situation, particularly the disease's ecological, social, and economic determinants (95–98). Efforts fostered the expansion of the health sector's national and local-level operating capacity for early diagnosis and treatment. The number of blood tests for malaria screening and diagnosis performed peaked at 10.2 million in 2000 (89, 92). The notable decline in the number of blood slides examined from 2001 to 2004 is due to unavailability of data from Peru, which examines approximately 1.5 million blood slides annually.

In 1998, the World Health Organization, along with partner institutions from the United Nations system, the World Bank, national governments of malaria-endemic countries, bilateral cooperation organizations, non-governmental organizations, and civil society, launched the Roll Back Malaria Initiative, with the goal of halving the global burden of malaria by 2010. During the 42nd Directing Council of the Pan American Health Organization in September 2000, the nations of the Americas committed themselves to the goals and ideals of the initiative (99).

Activities pursued through the Roll Back Malaria Initiative in the Region focused on supporting the health ministries' efforts related to malaria prevention and control; promoting synergies with related health programs, especially those dealing with environmental health, pharmaceuticals, maternal and child health, HIV/AIDS, and tuberculosis; promoting the participation of communities and civil society; engaging the private sector in the delivery of prevention and treatment; identifying best practices, partnerships, and finance mechanisms for extending interventions; preparing managerial tools and support measures; building capacity; and promoting collaboration among countries (90, 91, 95–98).

Along with the financial support extended through the Initiative, Member States harness national resources, contributions from other sources, loans, and PAHO technical and programmatic support to carry out malaria activities. The strategic framework has resulted in several successful collaborations and attempts to more efficiently mobilize resources. Highlights among these include the Amazon Network for the Surveillance of Anti-malarial Drug Resistance/Amazon Malaria Initiative, in which eight Amazon region countries participate and that receives financial support of the United States Agency for International Development (USAID); the approval of and successful use of funds allocated for the joint Andean proposal (Colombia, Ecuador, Peru, and Venezuela) and individual country proposals for Bolivia, Guatemala, Guyana, Haiti, Honduras, Nicaragua, and Suriname to the Global Fund to Fight AIDS, Tuberculosis, and Malaria; the Regional Action Program and Demonstration of Sustainable Alternatives for Malaria Vector Control without Using DDT (Global Environment Facility – DDT Project) in Mexico and Central America; and the research collaboration with the World Bank, United Nations De-

velopment Program, and WHO's Program for Research and Training in Tropical Diseases (90, 91).

As of 2004, 15 out of the 21 malaria-endemic countries reported decreases in the total number of cases. Eight of them have so far reached the Roll Back Malaria Initiative target of at least 50% case reduction by 2010 (Argentina, Bolivia, Ecuador, El Salvador, Honduras, Mexico, Nicaragua, and Paraguay); another seven registered decreases in case numbers but still have not reached the goal (Belize, Brazil, Costa Rica, French Guiana, Guatemala, Haiti, and Suriname); and six continue to report increases (Colombia, the Dominican Republic, Guyana, Panama, Peru, and Venezuela) (90, 91).

In 2001, Peru and Bolivia became the earliest adopters of artemisinin-based combination therapy against malaria. With an increased focus on research on drug resistance and the use of evidence-based treatment regimens, Bolivia, Ecuador, Guyana, Peru, Suriname, and Venezuela are now using various artemisinin-based treatment combinations as first-line therapy against *P. falciparum* malaria. Brazil and Colombia are expected to implement this policy in 2006. These eight countries account for 92% of all *P. falciparum* cases reported in the Region. Malaria cases in Haiti and the Dominican Republic, almost all of which are caused by *P. falciparum*, are still reported to be sensitive and non-resistant to chloroquine (90, 91).

The Regional Strategic Plan for Malaria, 2006–2010

The malaria situation in the Americas is permeated with strong sociopolitical, economic, behavioral, environmental, educational, administrative, and policy overtones. Sociopolitical and economic factors remain important aspects of the problem of malaria in the Region, including poor housing conditions, particularly among itinerant groups and isolated populations; various sociopolitical problems that impede access to programs; lack of political commitment to implement the Global Malaria Control Strategy in the local health services; illegal activities in some areas that prevent the identification of cases; an increase in demand and a reduction in resources in marginalized settlements; and lack of basic sanitation in marginalized settlements. The high level of migration among populations where prevention and control is most difficult—miners, loggers, banana and sugarcane plantation workers, indigenous groups, and populations living in areas of armed-conflict—is also linked directly to sociopolitical and economic conditions (90, 91).

Migration makes almost every aspect of malaria prevention and control extremely difficult to implement and monitor. Other behaviors reported to be an ongoing cause of malaria transmission include the tendency among the population to remain outside the home or protective shelter during the known period of increased hematophagous activity of vectors; limited community participation; limited social commitment and social mobilization; high rate of noncompliance to treatment regimens; improper self-medication; and use of expired or low-quality medications (90, 91).

Environmental factors such as the presence of natural breeding sites, favorable ecological conditions for the reproduction of vectors, the existence of virtually inaccessible or outrightly isolated communities, and the presence of multiple vectors, are likewise considered as important causes or aggravating factors (90, 91).

Many countries do not have enough health professionals trained in malaria (90, 91). Moreover, there is a need to conduct education on malaria prevention and control among the most affected groups.

The malaria problem's policy and administrative dimensions are the aspects that have the greatest potential for the most concrete interventions. At least 11 countries cited various administrative and policy issues that contribute to the persistence of malaria transmission in the Region, including a lack of budgetary allocations; limited health service coverage in malaria-endemic areas; a lack of intersectoral cooperation; a lack of stratification in control strategies; problems regarding the sustainability of measures; drug-supply problems; a lack of transportation; a lack of insecticide supplies; a delay in the release of funds; a delay in the approval and execution of projects; administrative and management problems in municipalities related to the decentralization process; disruption of country programs due to outbreaks of other infectious diseases such as dengue; inadequate vector control; and a lack of human and financial resources (90, 91).

The total expenditure (national and external contributions) for malaria reported by endemic countries increased from US\$ 107,798,405 in 2000 to US\$ 172,524,015 in 2004. The per capita expenditure of the reported population at risk of malaria in the Americas grew by 76%; from US\$ 0.37 in 2000 to \$0.65 in 2004 (Table 11) (90, 91, 100).

Notwithstanding the reduction in mortality related to *P. falciparum*, malaria remains an important public health problem in the Region, particularly the persistent transmission rate of *P. vivax*, which is more difficult to control because of its characteristic life cycle in humans. It is imperative that entomological research and surveillance be strengthened alongside health surveillance and disease management. Current investments aimed at combating the disease should at least be sustained, if not increased, and must be aimed at both immediate and long-term health reforms so that the desired results may be attained. Operational research must be enhanced, and adequate attention must be given to specific target populations that include pregnant women, children, persons living with HIV/AIDS, travelers, miners, loggers, banana and sugarcane plantation workers, indigenous groups, populations in areas of armed or social conflict, and persons living in areas of common epidemiologic interest or in border areas. National capabilities to address and manage special situations such as epidemics; complex emergencies; malaria in urban areas; and malaria in remote border and low-incidence areas where elimination may be possible, must likewise be built and reinforced. Investment on human resource development also is paramount.

The 2006–2010 Regional Strategic Plan for Malaria comprehensively addresses the current malaria challenge in the Region

and discusses PAHO's priority areas for technical cooperation as it fulfills its commitment to the Roll Back Malaria target. Achieving this goal fulfills the UN Millennium Development Goal of halting and beginning to reverse the incidence of malaria (and other major diseases) by 2015. In September 2005, PAHO's Directing Council proposed an additional 25% reduction (101).

Dengue

Dengue is caused by a virus of the genus *Flavivirus* (family Flaviviridae), which in the Americas is transmitted by the *Aedes aegypti* mosquito. There are four related but antigenetically distinct dengue serotypes (DEN-1, DEN-2, DEN-3, and DEN-4) that produce classic dengue fever or dengue hemorrhagic fever and dengue shock syndrome, the last two being the most serious clinical forms of the disease. The incidence of dengue and the numbers of outbreaks of the disease have risen in the last 35 years everywhere in the world. Prior to the 1950s, only nine countries had reported any cases of dengue. By the 1980s, 26 countries were reporting dengue cases and, since 1990, more than 100 countries around the globe have reported cases of the disease (102). The year with the largest number of reported cases of dengue was 2002, in which the disease struck 69 countries. Today, dengue is the leading viral disease transmitted by arthropods and represents a growing public health problem (102). On average, the burden of disease attributable to dengue is 658 disability-adjusted life years per 1,000,000 population (103).

Dengue and Dengue Hemorrhagic Fever in the Americas, 2001–2005

In 2001–2005 more than 30 countries of the Americas reported 2,879,926 cases of dengue and dengue hemorrhagic fever. The number of reported cases reached alarming proportions in 2002, with 1,015,420 cases (Table 12). There were 65,235 cases of dengue hemorrhagic fever during this same period, with the largest number of cases (15,500) reported in 2001 (Table 13). The number of deaths from dengue fever in the Region totaled 789 for the period as a whole, with the largest number of deaths (255) reported in 2002 (Table 12). All four dengue virus serotypes circulated in the Region (Table 14); in given years in the period, they were present simultaneously in Barbados, Colombia, El Salvador, French Guiana, Guatemala, Mexico, Peru, Puerto Rico, and Venezuela (104).

The following section analyzes the situation of dengue and dengue hemorrhagic fever in 2001–2005 by subregion.

Southern Cone

This subregion reported 64.6% of all cases of dengue and dengue hemorrhagic fever in the Americas in 2001–2005, with 1,859,259 and 4,509 cases reported, respectively, and 258 deaths. Brazil reported the most cases of dengue and dengue hemorrhagic fever (99.6%) and the most deaths from dengue in each year in the period (Table 12). In contrast, Chile and Uruguay were the only

TABLE 11. National budget for and nonbudgetary contributions to malaria control programs, Region of the Americas, 2000–2004.

Countries	2000			2001			2002			2003			2004		
	National malaria budget	Contributed funds, loans, and other sources		National malaria budget	Contributed funds, loans, and other sources		National malaria budget	Contributed funds, loans, and other sources		National malaria budget	Contributed funds, loans, and other sources		National malaria budget	Contributed funds, loans, and other sources	
Argentina	2,580,000	...	2,580,000	2,580,000	...	2,580,000	2,580,000	...	2,580,000	...	2,580,000	2,580,180	...	...
Bolivia	845,764	944,187	935,101	918,145	601,656	601,656	918,145	550,887	750,327	476,743	750,327	750,327	189,000	189,000	
Brazil	44,766,876	2,477,870	21,517,299	21,411,765	805,197	805,197	21,411,765	1,137,503	40,695,955	523,926	40,695,955	40,695,955	523,926	523,926	
Colombia	9,950,000	—	11,363,636	11,363,636	—	—	11,363,636	225,000	13,049,962	—	13,049,962	13,702,460	—	—	
Costa Rica	3,380,000	—	2,500,000	2,880,000	—	—	2,880,000	—	3,840,000	—	3,840,000	2,980,000	—	—	
Dominican Republic	1,410,013	157,238	1,443,223	1,220,721	29,722	29,722	1,220,721	5,000	25,860,927	1,200,675	25,860,927	448,254	15,676	15,676	
Ecuador	...	...	3,155,525	3,815,603	180,000	180,000	3,815,603	180,000	5,235,182	92,954	5,235,182	5,396,634	...	...
El Salvador	...	...	4,555,000	...	...	...	...	...	2,142,205	...	2,142,205	1,698,141	3,675	3,675
Guatemala	702,703	—	...	...	—	—	...	—	...	—	...	...	—	—
Haiti	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Honduras	2,597,868	3,605,010	2,352,572	81,250	1,450,000	1,450,000	81,250	54,039	388,888	7,289,800	388,888	4,850,000	7,285,000	7,285,000	
Mexico	17,652,182	—	17,157,485	19,576,235	—	—	19,576,235	—	19,576,235	—	19,576,235	28,060,594	—	—	
Nicaragua	333,333	—	333,333	333,333	175,500	175,500	333,333	175,500	333,333	175,500	333,333	...	...	...
Panama	5,066,318	—	4,680,289	3,986,849	—	—	3,986,849	—	2,751,541	...	2,751,541	5,024,766	88,417	88,417	
Paraguay	1,932,103	—	1,061,490	1,064,936	—	—	1,064,936	1,164,935	175,000	1,147,905	175,000	202,404	200,000	200,000	
Peru	1,900,915	58,572	4,109,728	3,900,000	130,000	130,000	3,900,000	200,000	3,500,000	200,000	3,500,000	3,600,000	200,000	200,000	
Venezuela	5,411,675	960,000	...	2,065,933	...	...	2,065,933	200,000	20,834,228	...	20,834,228	48,263,202	...	...
Subtotal	98,529,750	8,202,877	77,744,681	75,198,406	3,372,075	3,372,075	75,198,406	2,727,929	142,703,718	10,134,598	142,703,718	159,198,418	8,508,098	8,508,098	
Guyana	1,000,000	—	800,000	800,000	10,000	10,000	800,000	100,000	800,000	...	800,000	600,000	3,112,871	3,112,871	
Belize	...	...	...	...	...	...	...	...	...	...	...	100,000	238,000	238,000
French Guiana	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Suriname	65,778	—	178,363	160,628	636,000	636,000	160,628	536,000	160,628	606,000	160,628	160,628	606,000	606,000	
Subtotal	1,065,778	...	978,363	960,628	646,000	646,000	960,628	636,000	960,628	606,000	960,628	860,628	3,956,871	3,956,871	
Total	99,595,528	8,202,877	78,723,044	76,159,034	4,018,075	4,018,075	76,159,034	3,363,929	143,664,346	10,740,598	143,664,346	160,059,046	12,464,969	12,464,969	
Grand Total	107,798,405	107,798,405	82,741,119	79,522,963	82,741,119	79,522,963	82,741,119	79,522,963	154,404,944	154,404,944	154,404,944	172,524,015	172,524,015	172,524,015	
\$US funds per person in malarious areas	\$0.37	\$0.37	\$0.28	\$0.30	\$0.30	\$0.30	\$0.30	\$0.30	\$0.51	\$0.51	\$0.51	\$0.65	\$0.65	\$0.65	

Note: Funds per person derived only from countries reporting national malaria budget data (information incomplete).

— Not applicable

... Information not available.

Source: Pan American Health Organization. Epi-Data: Status of Malaria Tables, 1994–2004. [Online, cited 2006, July 20]. Available at: <http://www.paho.org/english/ad/dpc/cd/mal-status-2004.pdf>.

TABLE 12. Cases of dengue and dengue hemorrhagic fever (DHF), incidence and number of deaths from dengue, Region of the Americas, 2001–2005.

COUNTRY	2001			2002			2003			2004			2005		
	Cases of dengue & DHF	Incidence ^a	Deaths	Cases of dengue & DHF	Incidence ^a	Deaths	Cases of dengue & DHF	Incidence ^a	Deaths	Cases of dengue & DHF	Incidence ^a	Deaths	Cases of dengue & DHF	Incidence ^b	Deaths
Anguilla	25	208.33	0	5	41.67	—	2	16.67	0	0	0	—	0	0	—
Antigua and Barbuda ^b	20	30.77	0	5	7.69	—	0	0	0	0	0	—	0	0	—
Argentina	11	0.03	0	214	0.57	0	135	0.36	0	3,284	8.77	—	34	0.09	0
Aruba	0	...	—	25	...	—	180	58.44	0	173	166.35	—	—	0	—
Bahamas	0	...	0	0	0	—	557	207.84	0	1	0.32	—	0	0	—
Barbados	1,043	389.18	0	740	276.12	—	0	0	0	349	130.22	—	320	119.4	—
Belize ^b	3	1.3	—	41	16.4	—	0	0	—	2	0.87	—	380	164.5	0
Bermuda	0	0	0	0	0	—	0	0	0	0	0	—	2	3.17	0
Bolivia	176	14.67	0	892	74.33	1	6,548	327.4	6	7,39	369.5	0	4,443	222.15	0
Brazil	413,067	239.38	29	780,644	452.39	145	341,902	198.14	38	112,928	65.44	3	203,789	118.1	43
British Virgin Islands ^b	23	95.83	—	0	0	—	0	0	0	0	0	—	0	0	0
Cayman Islands	0	0	0	1	2.5	—	1	2.5	0	0	0	—	1	2.5	0
Chile ^c	—	—	—	636	—	0	0	0	0	0	0	0	0	0	—
Colombia	55,437	272.71	54	76,996	210.3	27	52,588	258.7	7	27,523	135.39	20	30,475	149.92	47
Costa Rica	9,237	818.16	0	12,251	314.53	0	19,669	606.32	0	9,408	290.01	0	37,798	1,165.17	2
Cuba	11,32	101.58	2	3,011	26.75	1	0	0	0	0	0	0	75	0.67	—
Curaçao	0	0	—	—	0	—	—	0	—	—	0	—	265	122.12	—
Dominica ^b	5	7.04	0	0	0	—	0	0	0	4	5.63	—	11	15.49	—
Dominican Republic	3,592	42.28	0	3,194	37.6	14	6,163	72.55	75	2,476	27.66	13	2,86	33.67	18
Ecuador	10,919	84.77	0	5,833	45.29	0	10,319	80.12	5	6,165	47.86	2	12,131	94.18	14
El Salvador	1,093	17.09	4	18,307	286.05	11	7,436	116.24	8	13,344	201.02	1	15,290	226.28	0
French Guiana	2,830	1664.71	0	280	164.71	—	2,178	1281.18	0	3,147	1851.18	—	4,365	2,567.65	0
Grenada ^b	12	12.77	0	84	89.36	—	17	18.09	0	7	7.45	—	0	0	0
Guadeloupe	0	0	—	93	21.58	—	495	114.85	0	0	0	—	3,364	780.51	0
Guatemala	4,516	38.64	2	7,599	65.02	6	6,75	57.76	3	6,352	54.35	4	6,341	54.26	1
Guyana	60	60	—	202	26.47	—	33	4.33	—	47	6.16	—	178	23.33	0

TABLE 12. (Continued).

COUNTRY	2001			2002			2003			2004			2005		
	Cases of dengue & DHF	Incidence ^a	Deaths	Cases of dengue & DHF	Incidence ^a	Deaths	Cases of dengue & DHF	Incidence ^a	Deaths	Cases of dengue & DHF	Incidence ^a	Deaths	Cases of dengue & DHF	Incidence ^b	Deaths
Haiti	9,077	138.05	0	32,269	490.78	17	16,559	251.85	11	19,971	303.74	2	—	0	—
Honduras	39	39	0	90	3.46	—	52	2	0	9	0.35	—	18,843	286.59	6
Jamaica	4,471	4471	4	392	101.55	—	791	204.92	0	0	0	—	46	1.77	—
Martinique	6,210	6.19	0	9,844	9.81	6	5,018	5	—	8,202	8.17	13	6,083	1,575.91	4
Mexico ^d	1	1	0	1	12.5	—	1	12.5	0	0	0	—	16,862	16.8	—
Montserrat	2,104	40.4	21	2,157	41.42	12	2,799	53.74	4	1,035	19.87	2	0	0	0
Nicaragua ^d	1,545	53.29	1	711	24.53	0	293	10.11	0	373	12.87	2	1,735	31.64	12
Panama	38	0.67	0	1,871	33.2	0	137	2.43	0	164	2.91	0	5,489	137.98	1
Paraguay	23,329	89.41	4	8,875	34.01	1	3,637	13.94	0	9,774	37.46	1	405	7.19	0
Peru	5,233	132.41	4	2,906	73.53	1	3,735	94.51	0	3,288	83.2	3	6,358	24.36	0
Puerto Rico	89	89	0	20	52.63	—	2	5.26	—	4	10.53	—	5,701	144.26	7
Saint Kitts and Nevis ^b	292	195.97	0	51	34.23	—	5	3.36	0	11	7.38	—	0	0	—
Saint Lucia ^b	3	2.63	0	125	109.65	—	3	2.63	0	4	3.51	—	1	0.67	0
Saint Vincent and the Grenadines ^b	760	181.38	0	1,104	263.48	—	285	68.02	—	375	89.5	—	8	7.02	0
Suriname	2,244	172.62	0	6,246	480.46	12	2,289	176.08	—	546	42	—	2,853	680.91	—
Trinidad and Tobago	0	0	0	0	0	—	2	11.76	0	1	5.88	—	411	31.62	0
Turks and Caicos Islands	96	8	0	29	2.42	0	40	3.33	0	0	0	—	1	5.88	—
United States ^e	—	—	—	—	—	—	0	0	0	0	0	0	0	0	0
Uruguay	83,180	337.69	15	37,676	152.96	1	26,996	109.6	7	30,693	124.61	5	4,198	171.31	4
Venezuela	652,212	140	140	1,015,420	—	255	517,617	—	164	267,050	—	71	427,627	—	159
TOTAL															

^aIncidence per 100,000 population.^bData provided by the Caribbean Epidemiology Center (CAREC).^cCases from Easter Island.^dOnly confirmed cases.^eImported cases.**Source:** Pan American Health Organization, dengue web page: <http://www.paho.org/english/ad/dpc/cd/dengue.htm>, accessed on November 2006.

TABLE 13. Cases of dengue hemorrhagic fever, Region of the Americas, 2001–2005.

	2001	2002	2003	2004	2005
Anguilla	0	0	0	—	—
Antigua and Barbuda ^a	0	0	—	—	—
Argentina	0	0	0	—	0
Aruba	—	—	—	—	—
Bahamas	0	0	0	—	—
Barbados	14	0	0	—	—
Belize ^a	—	0	—	0	0
Bermuda	0	0	0	0	0
Bolivia	0	1	47	25	10
Brazil	679	2,607	713	77	433
British Virgin Islands	—	0	0	0	0
Cayman Islands	0	0	0	0	0
Chile ^b	—	0	0	0	—
Colombia	6,563	5,269	4,878	2,815	4,306
Costa Rica	37	27	69	11	52
Cuba	0 69	12	0	0	—
Curaçao	—	—	—	—	—
Dominica ^a	0	0	0	—	4
Dominican Republic	4	76	252	136	84
Ecuador	55	158	416	64	334
El Salvador	54	405	138	154	207
French Guiana	0	0	0	0	0
Grenada ^a	0	3	0	0	0
Guadeloupe	—	0	0	—	6
Guatemala	4	47	22	39	32
Guyana	—	2	—	0	0
Haiti	—	—	—	—	—
Honduras	431	863	458	2,345	1,795
Jamaica	0	0	0	—	—
Martinique	3	0	0	—	3
Mexico ^d	191	1,429	1,419	1,959	4,255
Montserrat	0	0	0	0	0
Nicaragua ^d	458	157	235	93	177
Panama	7	5	0	4	2
Paraguay	0	0	0	0	0
Peru	251	13	15	35	16
Puerto Rico	36	23	5	11	19
Saint Kitts and Nevis ^a	4	0	—	—	—
Saint Lucia ^a	0	0	0	0	0
Saint Vincent and the Grenadines ^a	0	2	0	0	0
Suriname	12	23	1	7	141
Trinidad and Tobago	86	273	80	49	0
Turks and Caicos Islands	0	0	0	—	—
United States of America ^c	0	0	0	0	0
Uruguay	—	—	0	0	0
Venezuela	6,541	2,979	2,246	1,986	2,681
TOTAL	15,500	14,374	10,994	9,810	14,557

^aData for the non-Latin Caribbean furnished by the Caribbean Epidemiology Center (CAREC).^bCases from Easter Island.^cImported cases.^dOnly confirmed cases.**Source:** Pan American Health Organization. Available at: <http://www.paho.org/english/ad/dpc/cd/dengue.htm>, accessed November 2006.

TABLE 14. Circulating dengue virus serotypes, Region of the Americas, 2001–2005.

	2001	2002	2003	2004	2005
Anguilla	DEN 3	DEN 2, 3	DEN 3	DEN	DEN
Antigua and Barbuda ^a	DEN 3	DEN 3	DEN	DEN	DEN
Argentina	All imported	DEN 1, 3	DEN 1, 2, 3	DEN 3	DEN 2
Aruba		—	DEN	DEN 3	DEN
Bahamas		—	DEN 2, 3	DEN	DEN
Barbados	DEN 1, 2, 3, 4	DEN 3	DEN 1, 3	DEN 3	DEN 1, 3
Belize ^a		DEN 2	DEN	DEN 3, 4	DEN 1, 2, 3
Bermuda		—	DEN	DEN	DEN
Bolivia	DEN 1	DEN 1, 2	DEN 1, 2, 3	DEN 1, 2, 3	DEN 2, 3
Brazil	DEN 1, 2, 3	DEN 1, 2, 3	DEN 1, 2, 3	DEN 1, 2, 3	DEN 1, 2, 3
British Virgin Islands	DEN 2, 3	—	DEN	DEN	DEN
Cayman Islands		—	DEN	DEN	DEN
Chile ^b		DEN 1	DEN	DEN	DEN
Colombia	DEN 1, 2, 4	DEN 1, 3, 4	DEN 1, 2, 3	DEN 1, 2, 3, 4	DEN 1, 2, 3
Costa Rica	DEN 2	DEN 1, 2	DEN 1, 2	DEN 1, 2	DEN 1
Cuba	DEN 3	—	DEN	DEN	DEN
Curaçao		—	DEN	DEN	DEN
Dominica ^a	DEN 3	—	DEN	DEN	DEN
Dominican Republic		DEN 2	DEN 2	DEN 2, 4	DEN
Ecuador	DEN 2, 3	DEN 2, 3	DEN 3	DEN 3, 1, 4	DEN 1, 3
El Salvador	DEN 2	DEN 1, 2, 3, 4	DEN 2, 4	DEN 1, 2, 4	DEN 2, 4
French Guiana	DEN 1, 2, 3	DEN 3	DEN 1, 3	DEN 1, 3, 4	DEN 1, 2, 3, 4
Grenada ^a	DEN 2, 3	DEN 3	DEN	DEN	DEN
Guadeloupe		—	DEN 3	DEN	DEN 2, 3, 4
Guatemala	DEN 2, 4	DEN 2, 3, 4	DEN 1, 2, 3, 4	DEN 1, 2, 3, 4	DEN 1, 2, 3, 4
Guyana	DEN 2	DEN 3	DEN	DEN	DEN
Haiti					DEN
Honduras		DEN 2, 3, 4	DEN 2, 4	DEN 1, 2, 4	DEN 1, 2, 4
Jamaica		—	DEN	DEN	DEN
Martinique	DEN 2, 3	DEN 3	DEN	DEN	DEN 2, 3, 4
Mexico ^d		DEN 1, 2, 3	DEN	DEN 1, 2, 3, 4	DEN 1, 2, 3
Montserrat		DEN 2, 3	DEN	DEN	DEN
Nicaragua ^d	DEN 2, 3	DEN 1, 2, 4	DEN 1	DEN 1, 2, 4	DEN 1, 2, 4
Panama	DEN 2	DEN 2	DEN 2	DEN 1, 2, 3	DEN 1, 2
Paraguay	DEN 1, 2	DEN 1, 2, 3	DEN 3	DEN 3	DEN 2
Peru	DEN 1, 2	DEN 1, 2, 3	DEN 1, 2, 3	DEN 1, 2, 3	DEN 1, 2, 3, 4
Puerto Rico	DEN 1, 2, 3, 4	DEN 1, 3	DEN 1, 2, 3	DEN 2, 3, 4	DEN 2, 3, 4
Saint Kitts and Nevis ^a	DEN 2	DEN 2	DEN	DEN	DEN
Saint Lucia ^a	DEN 3	DEN 3	DEN	DEN	DEN 4
Saint Vincent and the Grenadines ^a	DEN 3	DEN 3	DEN 3	DEN	DEN 3
Suriname	DEN 3	DEN 3	DEN 2	DEN 3	DEN 1, 2, 3
Trinidad and Tobago	DEN 2, 3	DEN 2 (15%), 3 (85%)	DEN 3	DEN	DEN 3
Turks and Caicos Islands		—	DEN	DEN	DEN
United States of America ^c	DEN 1	—	DEN	DEN	DEN
Uruguay	DEN 2, 3	DEN 2, 3	DEN	DEN	DEN
Venezuela	DEN 1, 2, 3, 4	DEN 2, 3, 4	DEN 1, 2, 3	DEN 1, 2, 3, 4	DEN 1, 2, 3, 4

^aData for the non-Latin Caribbean furnished by the Caribbean Epidemiology Center (CAREC).^bCases from Easter Island.^cImported cases.^dOnly confirmed cases.**Source:** Pan American Health Organization. Available at: <http://www.paho.org/english/ad/dpc/cd/dengue.htm>, accessed November 2006.

South American countries that retained their transmission-free status. DEN-1, DEN-2, and DEN-3 circulated in Argentina, Brazil, and Paraguay during the period, with DEN-1 reported circulating on Easter Island, Chile, in 2002 (Table 14) (104).

Andean Area

Bolivia, Colombia, Ecuador, Peru, and Venezuela, reported only 21.1% of all cases of dengue and dengue hemorrhagic fever (580,589 cases), but accounted for the largest share of cases of dengue hemorrhagic fever (63.9%, or 41,704 cases) in 2001–2005. The subregion also reported 221 deaths from dengue. Bolivia had the subregion's highest rates per 100,000 population in 2003 (327.4), 2004 (369.5), and 2005 (222.15) (Table 12), while Colombia reported 70% of all deaths (155). All four serotypes circulated in Venezuela in 2001, 2004, and 2005 and in Peru in 2005; the number of serotypes circulating in Bolivia went from a single serotype in 2001 (DEN-1) to three serotypes in 2003 and 2004 (DEN-1, DEN-2, and DEN-3). Different combinations of the four serotypes circulated in Colombia and Ecuador.

Central America and Mexico

Central America reported 289,929 cases of dengue and dengue hemorrhagic fever, accounting for 10.6% of all cases in the Americas, including 8,519 cases of dengue hemorrhagic fever and 133 deaths. The countries reporting the largest number of cases in 2005 were Costa Rica and Honduras, followed by Mexico, El Salvador, Guatemala, Panama, and Nicaragua (Table 12). The number of reported cases in El Salvador rose sharply between 2001 and 2005, from 1,093 to 15,290. Costa Rica had the subregion's highest rate in 2005 (1,165 per 100,000 population). It was Nicaragua, however, which reported most deaths in the subregion, 51 for the period as a whole (Table 12). Though all four serotypes circulated in the subregion, the most prevalent ones are DEN-1 and DEN-2 (104).

The Caribbean

This subregion reported 76,222 cases of dengue and dengue hemorrhagic fever between 2001 and 2005 (2.6% of all cases in the Americas), including 1,271 cases of dengue hemorrhagic fever. The highest numbers of cases of dengue were reported in 2001 (19,023) and 2005 (19,103).

Latin Caribbean. Cuba had the most cases of dengue and dengue hemorrhagic fever in this subregion (11,432) in 2001 in the wake of an epidemic outbreak, followed by Puerto Rico (5,233), and the Dominican Republic (3,592). The Dominican Republic reported the most cases of dengue hemorrhagic fever (552 cases) in 2001–2005 (Table 13), along with 120 deaths, for a case fatality rate of 21.7%, one of the highest in the Region. All four dengue virus serotypes circulated in Puerto Rico, while the Dominican Republic reported the presence of serotypes DEN-2 and DEN-4 (104).

Non-Latin Caribbean. Of the countries and territories in this subregion, French Guiana, Martinique, and Trinidad and Tobago reported the largest numbers of cases of dengue and dengue hemorrhagic fever in the reporting period. Martinique reported 6,083 cases in 2005, followed by French Guiana (4,365), Guadeloupe (3,364), and Suriname (2,853). All four serotypes circulated simultaneously in Barbados in 2001 and in Guyana in 2005, though the most prevalent serotypes in this group of countries in 2001–2005 were DEN-2 and DEN-3 (104). In 2001, Halstead and colleagues documented the hyperendemic transmission of the hemorrhagic dengue virus in Haiti, despite the absence of the disease itself (105). There are no official reports on the number of cases of dengue in that country, however.

Dengue Prevention and Control Strategies

Thanks to highly effective campaigns for the eradication of the *Aedes aegypti* mosquito throughout the 1950s and 1960s, by 1972, the vector had been successfully eliminated in 21 countries of the Americas. However, programs became unsustainable or were abandoned altogether, and eventually the countries were re-infested (106). This, and a combination of ecological, economic, political, and social macrofactors, contributed to the vector's re-emergence, prompting the design of a new generation of dengue prevention and control programs currently serving as the cornerstone of the Regional prevention and control strategy (107).

PAHO's Regional Program on Dengue is designed to focus public health policies on promoting multisectoral, interdisciplinary integration for the framing, implementation, and strengthening of an Integrated Management Strategy (IMS) at the subregional and country level. The goal is to foster the functional integration of the activities in six key program components, namely mass communication, entomology, epidemiology, laboratory techniques, patient care, and the environment. To date, Central America has established a subregional Integrated Management Strategy, and there are efforts under way to promote the development of such a strategy in the MERCOSUR countries. There are 11 functioning Integrated Management Strategies at the country level (Brazil, Colombia, Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua, Panama, Paraguay, and Venezuela), with ongoing field operations designed to promote their development in other countries around the Region. These strategies apply the COMBI (Communication for Behavioral Impact) method specifically to dengue, replacing the information dissemination strategy used by programs for the past 15 years (108–110). This new approach offers an effective way to change the practices and behavior of individuals and communities with a view to promoting their "ownership" of prevention and control measures. Training activities in the COMBI method have been conducted in more than 22 countries in the Region.

The laboratory techniques component is essential to enable countries to diagnose cases of dengue. To this end, technical ca-

pabilities of existing laboratories have been strengthened and efforts are under way to establish proficiency programs for laboratories in the Americas and, where applicable, bolster existing programs with direct support and assistance from PAHO/WHO collaborating centers for dengue. There is a proposal for a Region-wide interprogrammatic integrated vector management plan for the implementation of cost-effective strategies for controlling the vector for dengue and other diseases in the Americas (111, 112).

The Regional Program's epidemiological surveillance component has helped to improve the reporting of statistical data on dengue fever through its network known as DENGUE-NET (113). The International Network of Eco-Clubs is yet another strategic alliance for the prevention of dengue, as it pursues community-based dengue prevention and control activities (114).

Dengue Research and Development: Remaining Challenges

The complexity of dengue transmission dynamics has prompted studies of different factors that contribute to the circulation and persistence of this virus (115). Various international initiatives and organizations, such as the Special Program for Research and Training on Tropical Diseases, the Pediatric Dengue Vaccine Initiative (116), WHO and its regional offices, the Canadian International Development Research Center, and the European Union Research Program are all promoting research work in this area (117–119). As of this writing, most funding is being channeled into research for the discovery of second-generation vaccines and the development of new or improved approaches to vector control (118, 119).

Chagas' Disease

Chagas' disease is a zoonosis unique to the Americas and is endemic in 21 countries. It is a vector-borne disease caused by the protozoan parasite *Trypanosoma cruzi*, following a chronic course. The disease is a byproduct of adverse socioeconomic conditions that affect vast portions of Latin America's population, particularly in rural areas (120). Chagas' disease is a chronic, systemic, parasitic infection with an important autoimmune component, whereby 20% to 30% of infected individuals develop serious forms of cardiopathy or digestive megaformations (mega-colon or megaesophagus) (121).

WHO estimates the current number of cases of human infection in the Americas at 18 million, of which approximately 5.4 million will develop into serious heart conditions and 900,000 into abnormal enlargements of digestive organs. There are an estimated 200,000 cases of the disease each year, with 21,000 yearly deaths directly related to this parasitic infection. Some 40 million people in Latin America are at risk of contracting the infection (122).

In 1993, the World Bank calculated the annual burden of Chagas' disease at 2.74 million disability-adjusted life years (DALYs),

representing an economic cost of more than US\$ 6.5 billion a year for endemic Latin American countries (123).

According to a 2000 cost-effectiveness study conducted as part of Brazil's Control Program for Chagas' Disease (124), US\$ 516.68 million had been spent on prevention and control measures between 1975 and 1995, during which period there were 387,000 deaths from this disease, or 17,000 deaths per year. In those same years, 50% of potential vector-borne transmissions were averted, representing 277,000 new cases of infection and 85,000 deaths. Moreover, 1.62 million DALYs were gained by averting 45% of potential deaths and 59% of potential disabilities. Control measures against transfusion-transmission of the disease prevented 5,470 new cases of infection and 200 deaths, gaining 17,900 DALYs by averting 8% of potential deaths and 92% of potential disabilities.

The estimated annual cost of treating patients suffering from Chagas' disease is somewhere around US\$ 19.78 million in Chile and US\$ 6.10 million in Uruguay. However, Chagas' disease control programs in both countries—with annual operating costs of US\$ 2.02 million and US\$ 133,000, respectively—successfully interrupted the disease's transmission nationwide in Chile in 1999 and in Uruguay in 1997 (125).

Disease prevention and control measures include: a) integrated vector control of triatomine species in households as a way to eliminate imported vectors and control indigenous species; b) screening of potential blood donors by blood banks as part of a safe-blood strategy; c) blood testing of pregnant women to detect maternal infections liable to be transmitted to the fetus via the placenta; and d) diagnosis, management, and treatment of infected individuals.

There are many ongoing national Chagas' disease control programs throughout the Region carrying out prevention and control efforts with different track records and varying levels of success. These programs all operate within the framework of international or subregional initiatives and horizontal technical cooperation programs. These initiatives are complemented by joint efforts such as the partnership between PAHO and WHO under the Control Program for Neglected Tropical Diseases, which help to globalize technical cooperation activities.

Argentina, Bolivia, Brazil, Chile, Paraguay, and Uruguay are participating countries in the **Southern Cone Initiative for the Elimination of Chagas' Disease**. The following are highlights of the Initiative's achievements:

- 1997—Vector-borne and transfusion transmission of *T. cruzi* was interrupted in Uruguay.
- 1999—Vector-borne transmission of *T. cruzi* was interrupted in Chile.
- 2000—Vector-borne transmission of *T. cruzi* by *Triatoma infestans* was interrupted in most endemic areas of Brazil.
- 2001—Vector-borne transmission of *T. cruzi* was interrupted in the endemic provinces of Jujuy, Neuquén, Río Negro, and La Pampa in Argentina.

- 2002—Transmission of *T. cruzi* was interrupted in Amambay Department in Paraguay and control programs continued to cover most endemic areas.
- 2002—A control program for Chagas' disease was established in Bolivia with assistance from the Inter-American Development Bank, PAHO, and the United Nations Development Program.
- 2004—After situation assessments were conducted in Río Grande do Sul (Brazil) and Entre Ríos (Argentina), the interruption of *T. cruzi* transmission was confirmed.
- 2006—Interruption of vector-borne transmission was confirmed in 711 municipalities in 13 states in Brazil, including all dispersal areas for *T. infestans*, thereby interrupting its transmission nationwide.

Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama participate in the **Initiative of Central American Countries for the Control of Chagas' Disease**, whose objectives are to interrupt vector transmission and eliminate transmission of *T. cruzi* by transfusion. Accomplishments in the subregion include expansions in coverage and improvements in the quality of vector control measures and blood-bank screening; transmission also has been interrupted in some areas. In addition, the number of sites infested with *Rhodnius prolixus* have been reduced, and it has been almost completely eliminated in El Salvador, Guatemala, Honduras, and Nicaragua; household infestations with *Triatoma dimidiata* have dropped 60% throughout the subregion. Strategic alliances with the Japanese International Cooperation Agency and the Canadian International Development Agency (CIDA) have played a pivotal role.

Participants in the **Andean Initiative to Control Vector Transmission and Transmission by Transfusion of Chagas' Disease** include Colombia, Ecuador, Peru and Venezuela. Given the differences in ecological and epidemiological conditions, and in the vector-borne transmission of the disease in this subregion, the participating countries decided to rely on a risk-approach for establishing control measures. To this end, and with a view to establishing a basic control strategy, a special workshop on this topic was conducted in Guayaquil in June 2004. Peru, for its part, has entered into a technical cooperation partnership with CIDA. The countries' national control programs have expanded their coverage.

Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname, and Venezuela are part of the **Intergovernmental Initiative for Surveillance and Prevention of Chagas' Disease in the Amazon Region**. The Initiative's goal is to integrate existing health programs and to develop a surveillance system for Chagas' disease that is linked to existing systems that operate within the framework of subregional integration projects or agencies. The Initiative grew out of an International Meeting on Surveillance and Prevention of Chagas' Disease in the Amazon

Region held in Manaus, Brazil, in September 2004, at which the nine participating countries acknowledged that American trypanosomiasis is a disease with an emerging epidemiology in that subregion and recommended the creation of an efficient and effective, adequate, sustainable, and responsive surveillance system with diagnostic capacity for coping with new situations (126). Brazil and Ecuador are setting up a surveillance system in their Amazon regions that is tied into the malaria surveillance system. All countries in the subregion have organized health care activities for Chagas' disease.

Given its scope and unique epidemiology, **Mexico** is dealing with Chagas' disease control through a national initiative. In 2002, nonetheless, the country set up a shared discussion space with the Initiative of Central American Countries for the Control of Chagas' Disease on control and elimination of *R. prolixus*, which has strengthened the formulation of control measures. Mexico declared the control of this disease to be a priority at a National Workshop for the Control of Chagas' Disease conducted in Huatulco, Oaxaca, in September 2003. The country has strengthened its vector-control strategies, its blood-bank screening, and the provision of care for persons who have contracted Chagas' disease.

It should be said that coverage has increased and the quality of blood screening for *T. cruzi* has improved in every endemic country. Moreover, efforts to coordinate and standardize the treatment of Chagas' disease have increase in all the subregions.

As of this writing, in the wake of improvements in socioeconomic conditions in the Region of the Americas, its various subregions, and its countries and given existing control and surveillance measures, the current epidemiological pattern of Chagas' disease underscores a number of interesting facts and challenges, namely (127):

- Overall, thanks to a new approach, Chagas' disease is under better control in the Region of the Americas.
- Control measures have been able to successfully interrupt the vector-borne transmission of Chagas' disease in large areas, but they lie alongside areas of active transmission with high morbidity and mortality rates.
- Rural-to-urban migration has affected the disease's vector-borne, transfusional, and congenital transmission and has led to a growing trend towards the urbanization of Chagas' disease.
- The incidence and prevalence of the disease are higher among socially disadvantaged groups and ethnic groups.
- New ecological and epidemiological niches for endemic areas of Chagas' disease have emerged or been identified, such as the Amazon subregion.
- New or newly recognized transmission modes are materializing or are on the rise, such as transmission via the digestive tract and through transplants.

- The coverage and quality of health care services must be improved, particularly in regard to the treatment of ill and infected individuals (128).
- Migration to non-endemic countries within or outside the Region is creating diagnostic, health care, and treatment needs at destination points.
- Prevention, surveillance, control, and care activities for Chagas' disease need to be reorganized in line with new epidemiological realities.

ZOONOSES

The link between animal and human health is highly important from a public health standpoint—61% of all species of organisms known to be pathogenic to humans and 75% of pathogens associated with emerging diseases are zoonotic (129).

In the countries of the Americas, technical cooperation activities that target zoonotic diseases are channeled along three broad directions: achieving the objectives of the unfinished agenda, as in the case of plague; sustaining existing achievements against diseases such as human rabies transmitted by dogs; and meeting new challenges such as that presented by leishmaniasis. The health ministries in the countries of the Region of the Americas have prevention and control programs for various zoonotic diseases, and they receive regular support and assistance from PAHO. However, there are several zoonoses that pose serious public health risks that have been neglected for many years and for which there are no existing control policies.

PAHO/WHO is the coordinating body for regional reporting systems to which the health ministries regularly report on information regarding human and animal rabies cases (130) and

human cases of plague. (131) The ministries of health and the World Organization for Animal Health (OIE) also furnish data on human and animal cases of other zoonotic diseases (132).

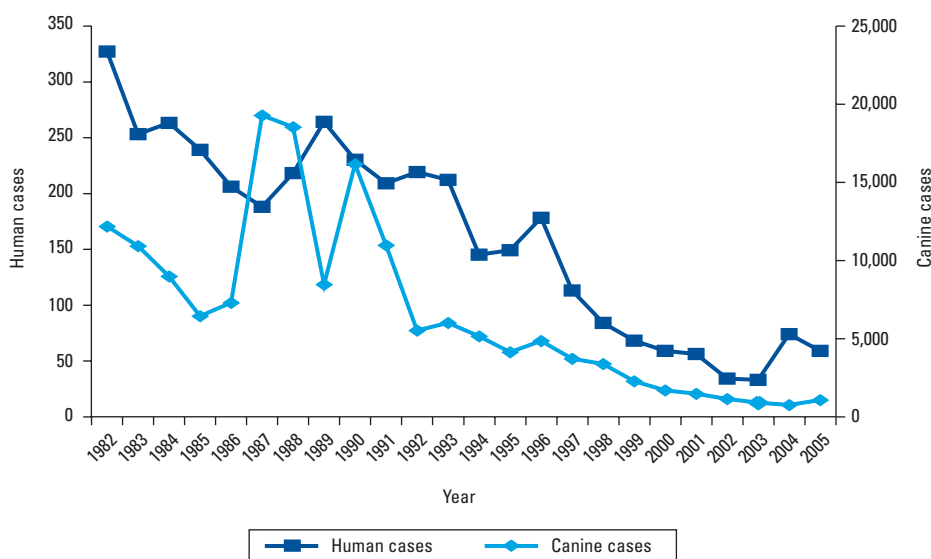
Rabies

The downturn in the number of cases of human rabies transmitted by dogs and canine rabies continued throughout 2001–2005. The decline in human rabies cases is attributable to the countries' efforts to strengthen epidemiological surveillance, conduct mass canine vaccination campaigns, and treat infected persons. A review of trends in rabies cases in the Americas in 1982–2005 shows an 81% drop in the number of human cases, from 332 to 64, and also a decrease in the number of canine rabies cases, which dropped by 89%, or from 12,524 to 1,427, during the same period (Figure 16). There were 11 cases of human rabies transmitted by dogs reported in the Americas in 2005. (130)

According to a PAHO study (133), most human rabies cases reported in 2001–2003 occurred in low-income groups residing in the outskirts of large cities such as Port-au-Prince (Haiti) and San Salvador (El Salvador), and in some Brazilian municipalities. These areas generally have higher densities of stray dogs bypassed by vaccination campaigns. Moreover, living and working conditions for residents of these areas curtail their access to treatment for dog bites. There was a sharp deterioration in the epidemiological situation of canine rabies in Bolivia in 2004, with outbreaks in La Paz, Cochabamba, and Santa Cruz de la Sierra. That same year, there were also concerns over the situation in Venezuela's State of Zulia.

Given the current status of rabies in the Americas, epidemiological surveillance is crucial. A study of the frequency of canine

FIGURE 16. Cases of human and canine rabies, Region of the Americas, 1982–2005.



Source: Regional Information System of Epidemiological Surveillance of Rabies (SIRVERA), PAHO, 2006.

rabies cases in relation to epidemiological surveillance activities by subnational geopolitical units (states, departments, and provinces) in 2001–2003 classified the Region into five different epidemiological areas, namely: 1) areas free of canine rabies for more than 10 years; 2) areas free of canine rabies for the last three years that had adequate epidemiological surveillance (annual sampling of a minimum of 0.1% of the estimated canine population); 3) areas free of canine rabies for the last three years and that have passable epidemiological surveillance (annual sampling of 0.09%–0.01% of the estimated canine population); 4) areas free of canine rabies for the last three years that have no epidemiological surveillance (silent areas with sampling rates of under 0.01%); and 5) areas with active circulation of rabies virus variants 1 and 2 in the canine population (134). The same study (134) classified the following countries and areas as free of canine rabies for more than 10 years: Costa Rica and Panama in Central America; Argentina (except for its border area with Bolivia); all of southern Brazil (including the states of São Paulo and Rio de Janeiro); Chile; certain departments of Peru; and Uruguay in the Southern Cone. At the other end of the spectrum is a zone of active circulation of the rabies virus in the canine population confined to limited geographic areas, including large portions of Bolivia, northern and northeastern Brazil, parts of El Salvador and Guatemala, the State of Zulia in Venezuela, and the Argentine/Bolivian, Bolivian/Peruvian and Guatemalan/Mexican borders.

Progress in the control of canine rabies is basically attributable to a strategy centered on mass canine rabies vaccination campaigns and timely prophylactic treatment for humans exposed to the disease (135). Some 44 million dogs are vaccinated every year in Latin America and one million or so humans at risk of contracting the disease are treated, 25% of whom receive post-exposure treatment. There is one health post administering rabies treatments for each 34 persons in Latin America (133). For detection and surveillance purposes, there is a rabies diagnosis network with over 100 national and regional laboratories processing close to 74,000 canine samples a year (133).

Prior to 2003, dogs were the main transmitters of rabies in the Americas. In 2004, the number of cases of human rabies caused by blood-feeding (vampire) bats for the first time outstripped the number of cases caused by dog bites (136). There were 51 reported cases of human rabies caused by blood-feeding bats in 2005 in the Amazon areas of Brazil, Colombia, and Peru, where many persons living in remote areas were bitten, with no readily accessible health facilities. A review of previous similar but smaller scale situations, showed that most outbreaks were associated with ecological changes or occurred in areas characterized by specific economic activities, such as gold mining and clearing of vegetation (137).

Plague

Plague, which has been around for more than a thousand years, has been responsible for millions of deaths in previous

centuries, mainly in three major pandemics beginning in the years 542, 1346, and 1894 (138). While the number of reported cases is currently relatively low, this disease is a reflection of wide health gaps in many countries around the globe. According to WHO, there are 2,000 reported cases of plague each year worldwide. Only Bolivia, Brazil, Ecuador, Peru, and the United States have reported cases of plague in the Americas; all other countries in the Region are considered disease-free. Countries in which the disease remains have ongoing control programs coordinated by their respective governments. The last reported outbreak in the Andean area in 1994, with reports of 1,128 suspected cases of the disease, was followed by a sharp plunge in the number of cases. On average, 12 cases a year were reported to PAHO by countries with endemic areas in 2001–2005 (131). Peru reported the largest number of cases in 2005; that year, there were 16 reported cases of plague in humans. In Latin America, the disease generally strikes impoverished communities in remote rural areas. Persons living there have limited access to health facilities and no basic infrastructure; moreover, their dwellings expose them to the elements and to epidemiological risk factors. The causative agent of plague (*Yersinia pestis*) is still found in wild rodent populations in these countries, whose fleas (*Xenopsylla cheopis*) can transmit the disease to household rats (*Rattus norvegicus* and *Rattus rattus*) that feed on crops stored by peasant farmers inside their homes. Domestic guinea pigs (*Cavia porcellus*) are part of the disease's causal chain in Andean countries due to the custom of breeding these animals inside the home. The circulation of *Y. pestis* in wild animal populations is the main obstacle to the elimination of this disease.

All countries have active surveillance programs for wild and domesticated animals (dogs) and ongoing control programs for household rodents and fleas in endemic areas. It should be said, however, that there is general consensus that any attempt to address this health problem and develop a comprehensive solution to it should include poverty-reduction policies established within the framework of commitments in furtherance of the Millennium Development Goals (MDGs), as well as active participation by local governments; collaboration among the health, agriculture, and housing sectors; and active community organization and participation.

Visceral Leishmaniasis

Visceral leishmaniasis is endemic in Latin America, with risk factors for the disease detected in areas of Argentina, Bolivia, Brazil, Colombia, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, and Venezuela. Most cases of the disease in the Region were reported by Brazil, with an average of 3,000 cases a year (139). Brazil has had an epidemiological surveillance program and system for this disease since the 1980s, but not all countries have such a system in place.

Although the disease is typically found in rural areas, recent reports indicate the emergence of cases in urban areas of large

“*Latin America is in a period of transition; it has not yet taken on the characteristics of the technologically advanced societies; and the dominant diseases are of the acute or chronic type and are governed by environmental factors that are susceptible to preventive measures.*”

Abraham Horwitz, 1964

cities around the Region. This shift may have something to do with socioeconomic problems that have led to an increase in rural-to-urban migration and ecological changes that have bolstered the proliferation of the disease's causative agent and vector.

Animals, mainly dogs, are the main reservoirs of visceral leishmaniasis. Humans are not reservoirs of the disease unless it is associated with other health problems; consequently it is basically a zoonotic disease (transmitted from animals to humans). Humans simultaneously infected by causative agents of leishmaniasis and AIDS may have high *Leishmania* loads in their blood, transforming them into reservoirs of the disease. This presents specific problems for the diagnosis and treatment of coinfecting patients and poses a risk of outbreaks of anthroponotic forms of the disease.

The identification and mitigation of the risk factors for leishmaniasis are essential to minimize its impact on public health. This requires efficient multidisciplinary coordination for successful vector control, reduction of rates of infection in animal populations operating as reservoirs of the disease, and the timely and effective diagnosis and treatment of infected individuals.

Echinococcosis/Hydatidosis

Cystic echinococcosis is a serious economic and public health problem in parts of the world whose economy is based mainly on livestock-raising. South America is one of the areas hardest hit by this disease, although there is no aggregate data on disease incidence due to differences in data collection methods (140). There are three species of the genus *Echinococcus* present in the Region of the Americas—*E. granulosus*, *E. oligarthus*, and *E. vogeli*—the first of which is especially important because it is the only species prevalent in both humans and animals. Moreover, the extent of the disease's socioeconomic impact and its significant effect on livestock production makes it a public health problem. It is perpetuated mainly through dog-sheep cycles in endemic areas, although it can also involve other ruminants and pigs (138). The species *E. vogeli* and *E. oligarthus*, causative agents of polycystic hydatid disease found mainly in Central America and the northern reaches of South America (Brazil, Colombia, Ecuador, and Venezuela), are perpetuated mainly through cycles involving wild hosts. The species *E. multilocularis*, causative agent of alveolar echinococcosis, is found primarily in arctic zones of North America. The hardest hit areas of South America are Argentina (Río

Negro, Chubut, Tierra del Fuego, Corriente, and Buenos Aires provinces), Brazil (the state of Río Grande do Sul), Chile (primarily Regions VII, X, XI and XII), Uruguay, and mountainous areas of Peru and Bolivia (140).

There is an ongoing cooperation-among-countries initiative for the control and surveillance of this infection, with PAHO and the FAO serving as its technical secretariat. Since 2004, the Southern Cone Subregional Program for the Control and Surveillance of Hydatid Disease (Argentina, Brazil, Chile, and Uruguay) has coordinated many operations carried out by the national control programs in each member country (140).

Brucellosis

Bovine brucellosis caused by *Brucella abortus* was eliminated from Canada in 1989 and from Jamaica in 1994 (4); it has had a limited presence in the United States since 2003 (141), and is present in most Latin American countries. Human brucellosis transmitted by small stock animals is also a serious public health problem in several countries. According to OIE reports, there have been no problems with caprine and ovine brucellosis in Brazil since 2001, in Chile since 1975, in Panama since 2001, or in the United States since 1999. There were, however, reports of cases of the disease in sheep and goats in limited areas of Argentina, Mexico, and Peru prior to 2004 (132). Up to 2004, there had been no cases of porcine brucellosis, presumably caused by *B. suis*, in Barbados, Belize, the British Virgin Islands, Canada, Costa Rica, the Falkland Islands, Guatemala, Haiti, Jamaica, Saint Vincent and the Grenadines, and Trinidad and Tobago. The last reported case in Brazil was in 2003, Chile in 1987, and Panama in 2001. The disease is still found in Argentina, Cuba, Mexico (where its presence is limited to certain regions), Nicaragua, Uruguay, and Venezuela (also limited to certain regions) (132).

There are inconsistencies in the reporting of cases of human brucellosis. Estimates show that most countries are likely to have sizeable numbers of undiagnosed or unreported cases of the disease (142).

Bovine tuberculosis

Bovine tuberculosis is being eliminated from Canada and the United States, where only limited areas have yet to be certified as disease-free. According to country reports to the OIE, as of 2004, there had been no reported cases of the disease in Barbados since 1978, in Belize since 1991, in Jamaica since 1989, and in Trinidad and Tobago since 2001. Argentina, Bolivia, Chile, Colombia, Costa Rica, Cuba, the Dominican Republic, Guatemala, Uruguay, and Venezuela all have reported cases of bovine tuberculosis. It has a limited presence in certain areas of Bolivia, Mexico, Nicaragua, Panama, Paraguay and Peru. (132) Plans for controlling bovine tuberculosis in Latin America are based on the segregation of animals with positive tuberculin tests. As in the case of bovine brucellosis, the involvement of private veterinarians accredited by

animal health agencies and supported by the private sector has had clear benefits, mainly in the dairy industry. The establishment of effective systems for segregating animals with positive tuberculin tests is imperative.

The inspection of slaughterhouses is the main surveillance activity for bovine tuberculosis conducted by animal health services in Latin America (143). Enteric transmission of the *Mycobacterium bovis* to humans is basically a result of the consumption of raw milk from tubercular cows. Since the 1950s, the main preventive measure has been the mandatory pasteurization of milk. There is still a risk of contracting tuberculosis from *M. bovis*, even in industrialized countries, however, due to the consumption of raw milk in certain rural areas. The elimination of bovine tuberculosis is considered a necessary prerequisite for the sustainable elimination of human tuberculosis from *M. bovis* (143).

HIV/AIDS AND OTHER SEXUALLY TRANSMITTED INFECTIONS

In 2001–2005, there were several positive forces at work at the global and Regional levels¹⁰ that could have a direct effect on people's lives, provided they are sustained and expanded. Substantial year-by-year increases in funding to support Regional and national efforts, coupled with a greater commitment from government, civil society, the private sector, and the international development community, could change the course of the epidemics of HIV/AIDS and sexually transmitted infections (STIs) in the Americas. The period saw a renewal of the health sector's response to these diseases worldwide with the launching of WHO's and UNAIDS' "3 by 5" initiative; at the Regional level, with the launching of PAHO/WHO's Regional HIV/STI Plan for the Health Sector, 2006–2015; and at the country level with the build-up of health services, particularly treatment. The challenges ahead for the health sector include strengthening its capacity for implementing public health interventions that combine prevention, care, and treatment to more effectively reduce the number of new HIV infections and to provide care and support to those living with HIV. The quest for universal access to prevention, care, and treatment will be the focus of the health sector's interventions in the coming decade.

Epidemiologic Overview for HIV/AIDS and STIs

WHO and UNAIDS estimate that at the end of 2005 there were approximately 3.23 million people living with HIV in the Americas (144). Of these, 60% (1.94 million) lived in Latin America and the Caribbean. The epidemic is currently on the rise; at least

220,000 people were newly infected with the virus during 2005. Up to December 2005, a cumulative number of 1,540,414 AIDS cases had been reported to PAHO/WHO, of which 30,690 (2%) were in persons under 15 years old. It is estimated that these numbers are far from accurate due to under-registration and reporting delays. In Latin America and the Caribbean the epidemic is diverse, and all modes of transmission coexist. The most affected subregion is the Caribbean, which ranks second among the world's ten regions for HIV prevalence, with rates among adults of 2%–3%. The epidemic in the Caribbean is generalized, but is concentrated in most parts of Latin America and North America.¹¹

PAHO/WHO and UNAIDS have reported (145) that the four groups that most commonly have prevalence rates of more than 5% in a concentrated epidemic are men who have sex with men, male commercial sex workers, injection drug users, and female commercial sex workers (Table 15). Recent surveys have shown HIV prevalence rates among men who have sex with men as high as 17.7% in El Salvador and 15% in Mexico. Rates in this group are also high in the Andean Area (for example, in Lima, Peru, the prevalence was as high as 21% in 2002). In Puerto Rico in 2003, 50% of all infections were associated with injectable drug use. In Argentina in 2003, the HIV prevalence rate among injecting drug users was 7.8%, compared to 0.3% among pregnant women. A recent multi-centric study conducted in Central America showed that HIV prevalence among female sex workers ranged from under than 1% in Nicaragua to more than 10% in Honduras. In 2000 in the Dominican Republic, the prevalence rates in female sex workers varied between 4.5% and 12.4% in the study sites. In Jamaica, HIV prevalence among female sex workers in Kingston was 10% and in Montego Bay, 20% in 2001. In Suriname, 21% of female sex workers were infected by HIV in 2003, while in neighboring Guyana the prevalence rate among the same group was 31% in 2000.

Other groups with high HIV prevalence rates are prisoners, migrant workers, members of the armed forces, truckers and other transport workers, and workers in mines and other isolated settings (145). HIV prevalence among prisoners is extremely high throughout the Region. In the Caribbean, a series of surveys conducted in 2004–2005 showed that prevalence rates among prisoners varied between 2% and 4%, while in the Dominican Republic and Argentina, the rate was 19% and 18.4%, respectively. Similarly, the rate of HIV infection in Mexican migrant workers who travel to the United States is 10 times higher than Mexico's national rate. The HIV seroprevalence among migrant workers in Guyana was 6% in 2001 (146).

¹⁰MDGs, UNGASS Declaration of Commitment on HIV/AIDS June 2001, WHO/UNAIDS "3 by 5" Initiative; December 2003, Summit of the Americas, PAHO/WHO Regional HIV/STI Plan for the Health Sector 2006–2015, UNGASS Declaration of Commitment on Universal Access; June 2001.

¹¹UNAIDS and WHO have recently classified HIV epidemics into three broad categories: low-level, concentrated, and generalized epidemics. In a low-level epidemic, HIV prevalence has not exceeded 5% in any subpopulation, although it may have existed for many years. In a concentrated epidemic, HIV has spread substantially, and the prevalence is consistently 5% in at least one subpopulation, is below 1% in pregnant women in urban areas, and has not been well established in the general population. In a generalized epidemic, HIV is firmly established in the general population and the prevalence is consistently 1% among pregnant women.

TABLE 15. HIV prevalence in men who have sex with men and in female commercial sex workers, Central American and Andean countries, various surveys, 1999–2002.

	Number Surveyed	Percent with HIV
Men who have sex with men		
El Salvador (2002)	356	17.70%
Guatemala (2002)	165	11.50%
Honduras (2001)	349	13%
Political capital, Tegucigalpa	171	8.20%
Economic capital, San Pedro Sula	178	16.00%
Nicaragua (2002)	199	9.30%
Panama (2002)	432	10.60%
Bolivia, La Paz (1999–2001)	48	14.60%
Santa Cruz (2001–2002)	186	23.70%
Three other cities (2002)	52	15.40%
Colombia, Bogotá (2002)	660	19.70%
Ecuador, Quito (1999–2001)	263	14.40%
Guayaquil (1999–2001)	227	27.80%
Four other port cities (2001–2002)	142	2.80%
Peru, Lima (1999–2000)	7,041	13.70%
Provinces, rural (1999–2000)	3,898	6.10%
Female commercial sex workers		
El Salvador (2002)	491	3.60%
Guatemala (2002)	536	4.50%
Honduras (2001)	535	n/a
Economic and political capitals (2001)	369	10.90%
Ports, Puerto Cortés and San Lorenzo (2001)	163	8.20%
Nicaragua (2002)	463	n/a
Capital, Managua (2002)	324	0.00%
Ports, Corinto and Bluefields (2002)	139	1.40%
Panama (2002)	432	n/a
Capital, Panama (2002)	291	1.90%
Colón (2002)	141	2.10%
Bolivia, Santa Cruz (2001)	195	0.50%
Three cities on the Argentine border (2002)	77	0%
Colombia, Bogotá (2001–2002)	514	0.80%
Ecuador, Quito (2001–2002)	200	0.50%
Guayaquil (2001–2002)	1,047	2.10%
Peru, Lima (1999–2000)	3,347	1.60%
Provinces, rural (1999–2000)	4,930	0.60%
Venezuela, Isla Margarita (2002)	652	0.00%

Sources: Montano, SM et al (2005). Prevalences, Genotypes, and Risk Factors for HIV Transmission in South America. *Journal of Acquired Deficiency Syndrome*. Vol. 1. September 2005.

Central American Multi-site HIV/STI Prevalence and Behaviour Study (results published in 2003 and available, by country, at: http://pasca.org/english/estudio_informes_eng.htm).

Even though an important proportion of countries still exhibit concentrated epidemics, there is a trend towards generalized epidemics in most of the Region's countries, with few exceptions (144). In 2005, 30% of adults living with HIV/AIDS in the Americas were women, ranging from 25% in North America to 31%

and 51% in Latin America and the Caribbean, respectively (144). The male:female sex ratio in reported AIDS cases is declining rapidly in the Region. Regionwide, the proportion of all reported adult cases (for which sex is reported) among women has increased over time, from 6.1% before 1994, to 15.8% in 1999, and to 16.5% in 2002. In Brazil, the male:female ratio declined from 24:1 in 1985 to 1.5:1 in 2004; in Argentina, it declined from 15:1 in 1985 to 2.5:1 in 2004. In Trinidad and Tobago, the ratio declined from 6.25:1 in 1985 to 1.5:1 in 2002 (146). More and more young people are being affected by the epidemic. UNAIDS estimates that in Latin America and the Caribbean, the number of children under 15 years old who are infected with HIV increased from 130,000 in 2003 to 140,000 in 2005. Limited recent data exist regarding HIV infection in indigenous people, Canada, however, reports indigenous peoples in that country are being disproportionately affected by the HIV virus (146).

To date, most infections are due to unprotected sexual intercourse, although in several Southern Cone countries, injectable drug use is the major driving factor behind transmission. (144)

Despite the introduction of antiretrovirals, deaths due to AIDS continue to increase in the Region (144). The estimated number of deaths due to AIDS in adults and children increased from 97,000 in 2003 to 104,000 in 2005. However, a decline in reported mortality was observed in some countries that had introduced antiretrovirals early on (Bahamas, Brazil, Canada, and the United States) (146).

HIV/Tuberculosis Coinfection

In 2005, almost all the Region's countries reported some prevalence rates of HIV infection among tuberculosis (TB) patients. The reported prevalence rate of HIV infection in TB patients ranges from under 1% in some countries with low levels of or concentrated epidemics to more than 30% in some countries of the English-speaking Caribbean that offer HIV testing on a routine basis to TB patients.

Sexually Transmitted Infections

While responding to the threat posed by the HIV/AIDS epidemic, the Region continues to be challenged by the spread of STIs. It is estimated that 50 million new cases of STIs occur in the Americas each year. Surveys conducted in some Caribbean countries found that STI patients are seriously affected by the HIV epidemic. In several instances, HIV prevalence rates are two to six times higher among STI patients than in the general population. The magnitude of the STI epidemic in the Region is difficult to measure, given limited data, underreporting, and weaknesses of the surveillance systems. Examples of data from different countries obtained by various methods illustrate the problem. In a sentinel site in Chile, of 10,525 STI consultations between 1999 and 2003, 22% of patients were diagnosed with condyloma, 10.4% with latent syphilis, and 10.1% with gonorrhea. A similar situation was observed regarding cases of gonor-

TABLE 16. Prevalence of syphilis and congenital syphilis, reporting countries, Latin America and the Caribbean.

Country	Year	Prevalence of syphilis in pregnant women (%)	Congenital syphilis (per 1,000 live births)	Method
Bahamas	2004	2.4	1.3	Routine
Belize	2004	1.5	0.13	Routine
Bolivia	2004	4.9	12	Survey
Brazil	2004	1.6	4	Routine
Costa Rica	2004	NA	1.3	Routine
Cuba	2003	1.8	0	Routine
Ecuador	2002	NA	1.11	Routine
El Salvador	2003	6.2	0.9	Routine
Haiti	2004	4.2	NA	Survey
Honduras	2003	3.5	2.5	Routine
Jamaica	2003	NA	0.7	Routine
Mexico	2004	0.62	0.06	Routine
Nicaragua	2004	NA	0.06	Routine
Panama	2004	0.4	0.1	Routine
Paraguay	2003	6.3	1.9	Routine
Peru	2004	1	1.7	Routine

Sources: Ministries of Health of the reporting countries; Bolivia's Population Council.

rhea and syphilis among STI patients in Nicaragua during 2000–2002. A population-based survey (147) conducted in 2004 among adults in Barbados found that 14.3% of that population was infected by gonorrhea or chlamydia. In the United States, cases of primary and secondary syphilis declined between 1990 and 2000. However, the number of annual cases of syphilis increased during 2000–2002 and continued to increase from 2002 (6,862 cases) until the end of 2003 (7,177 cases). Surveys conducted to determine the prevalence of syphilis among different at-risk populations have demonstrated that vulnerable groups in Latin America are heavily affected by STIs. For example, in 2003, the prevalence of syphilis in Paraguay was 4.3% among blood donors and 6% among pregnant women, compared with a high prevalence rate of 37.4% among female sex workers. In 2004, a survey conducted by the Ministry of Health of Guyana found that 27% of female sex workers were infected with syphilis. In 2003, 15,570 cases of congenital syphilis were reported from 11 Latin American and Caribbean countries; during the same year, PAHO estimated that 110,000 cases had occurred, indicating serious underreporting of cases of congenital syphilis. The prevalence of syphilis among pregnant women and the incidence of congenital syphilis are summarized in Table 16. In countries where cases of congenital syphilis are reported annually, an increasing trend is observed (148). In Venezuela, cases increased from 50 in 2000 to 135 in 2002, and in Brazil, the rate of congenital syphilis per 1,000 live births increased from 1 in 2001 to 1.5 in 2003. Coverage and access to syphilis screening and treatment services continues to

be a public health issue in the Region, even in countries that have expanded their services to prevent mother-to-child transmission of HIV (for example, in 2003 only 17.3% of pregnant women diagnosed with syphilis were treated, even though Brazil's coverage for syphilis screening is 56.5%).

Socioeconomic Determinants and Compounding Factors in HIV Transmission

Socioeconomic marginalization increases the vulnerability to HIV transmission. This vulnerability, combined with gender inequities and a tendency towards risky behavior, including engaging in unprotected sex and alcohol and drug use, render persons younger than 25 years old (30% of the Region's population) particularly susceptible to HIV and other STIs (146). In a PAHO/WHO survey in the Caribbean in 2003, around one-third of young people (ages 10–18) reported that they were sexually active. Of these, nearly one-half said that their first sexual experience had been forced, and almost two-thirds stated that they had had intercourse before age 13. Of sexually active young people, only one-quarter always used a birth control method. Many of the sexually active youth reported being worried about getting AIDS, but only slightly more than half had used a condom during their last intercourse (149). In Latin America and the Caribbean, between one-quarter and two-thirds of young women marry during adolescence (150). Marriage of girls prior to age 18 places them at greater risk of HIV infection than sexually active unmarried girls (151). Many international and national AIDS prevention messages encourage abstinence until marriage, implying that marriage provides complete protection against HIV (150), when, in fact, for many adolescent girls, marriage results in a transition from virginity to frequent unprotected sex. Moreover, a recent review of adolescents worldwide found that “there is reason to believe that marriages of young women and older men are less equitable” than other marriages (152).

Children orphaned by HIV are particularly disadvantaged. Even HIV-negative orphaned children still lack the support and nurturing offered by a stable family environment, which can increase their vulnerability and likelihood to engage in high-risk behaviors.

For those infected, pediatric formulations of antiretroviral medicines remain highly inadequate. Only a handful of the antiretrovirals in the current WHO guidelines are available in formulations that are affordable, feasible, or acceptable for use in infants and young children. The global market for pediatric AIDS drug formulations is not attractive for originator or generic companies; in wealthy countries very few children are being born with HIV, and in developing countries, where most of the infected children are, pediatric formulations are not considered a priority or a lucrative market (153).

Gender inequity continues to be a central issue to HIV in the Region. In 2005, more than one-third of new HIV infections

worldwide were among women with long-term partners (144). In Latin America and the Caribbean, a large number of women with HIV have been infected by their husbands or regular partners. For example, in Colombia in 2005, 72% of women testing HIV-positive at projects aimed at preventing the transmission of HIV from mother to child were in stable relationships, and 90% described themselves as “housewives” (144). The major interventions known to have an impact on HIV transmission—abstaining from sex, having sex with only one uninfected partner, or using male condoms—are often not under women’s control due to a variety of societal norms and social conditions. In most countries in the Region, men have the most power in sexual relationships, with women at a disadvantage in protecting themselves from HIV (154). Using a female condom is difficult without the knowledge and consent of a woman’s sexual partner, and transactional sex and sex work may be necessary for many women for economic survival. “For many women, current prevention methods are inadequate—women often do not have the social and economic power to refuse sex or negotiate condom use” (155).

A high prevalence of violence and sexual coercion also puts women at risk. There is a link between HIV and gender-based violence (156, 157). Women and adolescent girls threatened by violence and rape, including married women, cannot negotiate condom use. A study in Haiti among married women aged 15–19 years old found that 25% had experienced violence at the hands of their husbands (often sexual violence), within the 12 months prior to the Survey (158). Gender norms that validate coercive sex, acceptability of gender-based violence against sex workers, and males’ gender-based violence need to be changed (159). Violence is also perpetrated against gay, lesbian, transgender, and bisexual populations in the Region. Homophobia places men at risk by ignoring the health needs of men who have sex with men. Also damaging is the definition of “being a man” as having sexual relations with multiple female sexual partners (160). Discrimination forces men who wish to engage in sexual activities with other men to go underground and deny the existence of the risk behavior. This deters prevention programs from reaching them and puts their unknowing female sexual partners at risk. In the Region, prevailing gender norms dictate that men have multiple sexual partners as a way to validate their masculinity, but the practice ends up validating ignorance about sexuality and submissiveness for young girls and women, which can lead to increased rates of HIV (161). A study of 148 HIV-positive women in São Paulo, Brazil, found that more than half (53%) did not perceive themselves to be at risk of HIV before learning they were HIV-positive, and 29% only went for testing after their partners became ill (162). Demographic Health Surveys in the Region found that men were four to five times more likely to report a greater number of casual sexual partners in the last year than women.

The mobility of populations plays an important role in the spread of HIV. Populations on the move, including migrant workers, are at risk because of complications derived from their

poverty, lack of access to services, and lack of information, as well as their transient nature and the fact that they spend long periods away from their families, leading them to engage in transactional sex. Migrant workers who lack the necessary documentation to remain legally in their host country may face difficulties in receiving health care services or may hesitate to seek services out of fear of being deported (146).

Injecting drug use plays an important role in the spread of the epidemic, particularly in North America, Brazil, and the Southern Cone. In some cities in Brazil, the HIV prevalence rate among injecting drug users in 2004 was 60 times higher than the rate in the general population. Although injecting drug use has become a significant factor in the epidemic Regionwide, with infection rates reaching 60% in some cities, there is limited political support for developing programs to address this issue.

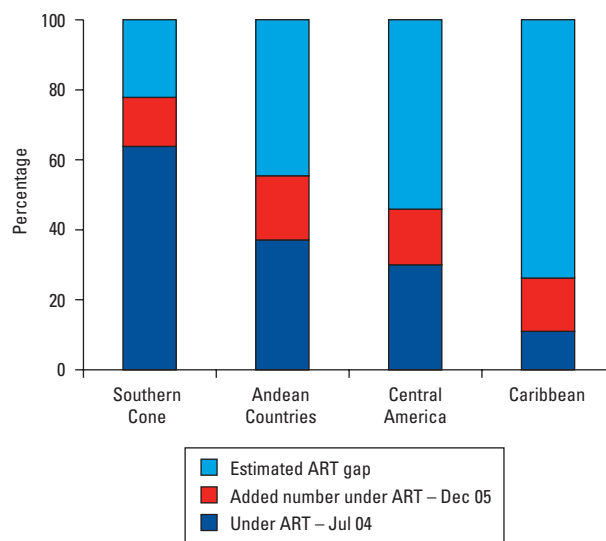
The Health Sector’s Response: Key Achievements

The Region of the Americas has, since the epidemic began, swiftly responded to the challenges of HIV infection. The health sector established and maintained national AIDS programs. Most countries also have set up national AIDS committees or councils to function as intersectoral collaboration mechanisms. In Latin America and the Caribbean at least 15 countries have national networks, social organizations, and community-based organizations dealing with HIV/AIDS, covering a myriad of focus areas that include advocacy, promoting adherence to treatment, the conduct of operational research, and the pursuit of more integrated perspectives. Several countries in the Region are using a comprehensive approach to tackle HIV that seeks to give equal weight to prevention and treatment efforts. Most countries have successfully launched prevention interventions, which have had a positive effect. In Haiti, for example, the percentage of HIV-infected pregnant women declined by half from 1993 to 2003–2004 (144), despite the fact that Haiti is one of the Region’s poorest countries. Programs to promote testing and counseling in various modalities—such as voluntary counseling and testing (VCT) or provider initiated testing and counseling (PITC)—have expanded and been effective in changing behaviors to reduce HIV transmission. A randomized control trial in Kenya, Tanzania, and Trinidad and Tobago found that persons who received VCT significantly changed their risk behaviors compared to those who only received health education. For instance, the percentage of persons who reported having unprotected intercourse with non-primary partners declined by 35% among men and 49% among women who received VCT, as compared to 13% of men and women who only received health education (163). Health programs that increased access to condoms and media campaigns that promote condom use have resulted in increased condom use. In Brazil in 2004, 51.6% of adults 15–54 years old, 58.4% of young adults 15–24 years old, and 66.9% of men who have sex with men reported regular condom use with casual partners. In the same

age groups and the same year, 76%, 74.1%, and 80.7%, respectively, reported that they had used a condom in their last intercourse with a casual partner (164). Sex education has been shown to delay initiation of sexual intercourse and reduce risky sexual behavior. Providing skills has been more effective than merely providing information. In 2005, a review was conducted of 83 evaluations of curriculum-based efforts to reduce adolescent sexual risk behaviors that promoted abstinence but also discussed or promoted condom use and/or contraception (including 18 studies in Brazil, Chile, Jamaica and Mexico). Results found that many programs had positive effects on knowledge, awareness of risks, values, attitudes, self-efficacy, and intentions (165). The evaluations found significantly increased condom use and none found decreased condom use; half of the evaluations found significantly decreased sexual risk-taking behavior and none found increased sexual risk-taking (165). However, abstinence-only education has not been shown to delay the onset of intercourse (167, 168). A review of the impact of abstinence-based programs on risk behaviors in developing countries “found little evidence of the effectiveness of these types of programs in changing individual behavior in developing countries (168).” Interventions for specific vulnerable groups, however, have proven to be effective. Brazil has successfully kept the prevalence of HIV at a low and stable rate of 6% among sex workers, with 74% of sex workers in 2004 reporting consistent use of condoms with clients (164). Prevention of mother-to-child transmission services have resulted in a significant reduction in the number of HIV-infected children in some of the Region’s countries (146).

PAHO/WHO’s “3 by 5” Report indicated that all countries in the Region have achieved an unprecedented acceleration in the provision of antiretroviral treatment, especially during 2004 and 2005. The goal of treating at least 600,000 people in the Region who require treatment has been met and exceeded. Since January 2004, more than 100,000 new treatments have been initiated in Latin America and the Caribbean alone. However, there are important gaps in the Region (Figure 17). For the first time, the Region has access to the necessary resources to begin to match the need for care and treatment. The Global Fund has disbursed US\$ 480 million to 28 countries in the Region and to subregional venues such as the Pan-Caribbean Partnership Against HIV/AIDS (PANCAP). Moreover, lower prices obtained through negotiations between the countries and pharmaceutical companies have resulted in greatly reduced prices for first-line antiretrovirals. In several countries in the Region where ART has been provided through the health system for several years, dramatic declines in death rates have been observed. Bahamas, Brazil, Canada, Costa Rica, Haiti, and the United States, for example, have experienced impressive declines. These countries recognized early on that treatment is key for prevention and control, as well as for direct, positive impact on the lives of people with HIV. By 2003, the Bahamas had experienced a 56% reduction in AIDS deaths overall and a reduction of 89% of deaths among children since the introduction of ART.

FIGURE 17. Estimated percentage of people under anti-retroviral treatment (ART) and treatment gap, by subregion,^a 2004–2005.



^aExcludes Brazil, Mexico, Canada, and the United States.

Source: PAHO/WHO. Toward Universal Access to HIV Prevention, Care and Treatment: 3 by 5 Report for the Americas.

Completing the Unfinished Agenda: 2006 and Beyond

The negative impact of the HIV epidemic on demographic trends in the Region has been well documented. If current trends continue, AIDS will be responsible for reducing life expectancy by at least 10 years by the end of 2010 in hard-hit countries such as the Bahamas, Guyana, and Haiti. According to PAHO/WHO projections (146), in order to halt and reverse the spread of HIV by 2015 (MDG 6), new infections will have to be reduced by 50% by 2010, with an additional 50% reduction by 2015. This will only be possible by strengthening the health sector response so as to be able to scale up HIV/AIDS activities in the Region. In most countries, services are still centralized in specialized clinics located in large cities, and the integration of services at the primary level of care is still very limited. The provision of vertical services in specialized HIV and STI clinics is a known barrier for access to care because it further isolates people suffering from these illnesses and may even perpetuate stigmatization and discrimination.

The spontaneous demand for counseling and testing, essential for the early detection of HIV-positive individuals, is also compromised due to the limited availability of community-level quality services that are backed up by adequate referral systems. While prevention is key to the success of the fight against HIV, primary health care services are not equipped to provide comprehensive prevention services for vulnerable groups, such as youth, injecting drug users, men who have sex with men, and commercial sex workers. Similarly, the prevention and treatment of STIs, diseases that are an important risk factor for HIV, have

not received adequate attention in the health sector in recent years. Rapid scale-up of comprehensive care and treatment requires an array of essential support services that, until now, are largely inadequate in most countries of the Region. Drug procurement and management systems have not expanded rapidly enough to effectively support the provision of direct patient care. The supply of antiretroviral drugs and laboratory diagnostics has been hampered by inconsistent pricing policies by the Region's manufacturers. Obtaining further reductions in prices, particularly in second-line medicines and diagnostics, is a priority for the Region.

The extension and expansion of services for people with HIV is occurring within a context of limited qualified human resources. Health providers may not be equipped or motivated to provide comprehensive care and treatment; they often lack the necessary training and specialization and they may not be deployed to the areas where services are most needed. There is a lack of human resource strategic planning and management processes to inform the ministries of health on critical issues related to policies, staffing, cost, and accreditation needs. Moreover, some fiscal policies implemented by countries impose limitations on the ministries of health regarding the hiring and retention of staff. The benefits package offered by the public health sector generally cannot compete with that offered by the private sector or even that offered by externally funded projects within the public sector.

The proliferation of services in the for-profit and nonprofit sectors has contributed to the rapid expansion of HIV services and has improved access to care for specific population groups or people living in specific areas. Nonetheless, these services can present a challenge for improving public health systems because public services may lack the authority to regulate private services, resulting in a lack of consistency in guidelines and treatment protocols, as well as poorly defined referral systems. Scaling up services also presents challenges in the areas of management, monitoring, and evaluation. The majority of countries do not have adequate health information systems, and challenges exist in regard to collection of HIV data, assurance of confidentiality, and integration into existing systems. The lack or limited availability

of good and timely data has been recognized as a major obstacle to inform country and Regional efforts.

While the increased investment in HIV/AIDS in Latin America and the Caribbean by a variety of development initiatives has clearly benefited the countries, it also leads to the fragmentation of local responses and puts considerable pressure on the countries' limited human and financial resources. Despite wide acknowledgement of the importance of the "Three Ones" principles for the coordination of national AIDS responses, development partners continue to stress their own agendas, including separate monitoring and evaluation mechanisms. In order to cope with these pressures, national programs are forced to make strategic choices in order to make the most of the increased support. They face the challenge of streamlining efforts to avoid parallel processes and to ensure a balanced investment in multiple sectors of society.

To support the strengthening of the health sector's response in the Region of the Americas, PAHO/WHO launched the "Regional HIV/STI Plan for the Health Sector, 2006–2015" in November 2005 (Box 2). The Plan is a "further step to promote effective prevention and care." The Regional Plan will guide PAHO's work in the years to come.

CHRONIC COMMUNICABLE DISEASES

Tuberculosis

Tuberculosis is one of the oldest diseases; its effective treatment was discovered in the middle of the 20th century. It is still very far from being eliminated as a public health problem in the Region of the Americas, however. Despite progress made toward tuberculosis control in the 1990s, this preventable, treatable, and curable disease still has a prevalence rate of more than 466,000 cases in the Region, and is responsible for more than 50,000 deaths per year (168). Although tuberculosis can affect any segment of the population, regardless of socioeconomic status, it is the poorest and most vulnerable population groups—migrants, persons living in urban marginalized areas, prisoners, people with HIV/AIDS, and indigenous populations—who carry the greater burden of disease.

BOX 2. Critical Lines of Action for the Regional HIV/STI Plan for the Health Sector

1. Strengthen health sector leadership and stewardship and foster the engagement of civil society.
2. Design and implement effective, sustainable HIV/AIDS/STI programs and build human resource capacity.
3. Strengthen, expand, and reorient the health services.
4. Improve access to medicines, diagnostics, and other commodities.
5. Improve information and knowledge management, including surveillance, monitoring and evaluation, and dissemination.

In the Americas, marked differences exist among countries in terms of the burden of tuberculosis. In countries that have established market economies, such as the United States, Canada, and some English-speaking Caribbean countries, the incidence of tuberculosis is estimated at five cases per 100,000 population. In countries with fewer resources, the incidence rate is much higher; for example, it is estimated that it is 61 times higher in Haiti, 43 times higher in Bolivia, and 35 times higher in Peru (Table 17). There also are differences in incidence rates within countries. The countries that have assigned priority for tuberculosis control include Bolivia, Brazil, Colombia, the Dominican Republic, Ecuador, Haiti, Honduras, Guatemala, Guyana, Mexico, Nicaragua, and Peru, which together account for 80% of the cases reported in the Region.

In 1994–2004, there was a slight downward trend in the reported incidence rate for all forms of tuberculosis (Figure 18), from 32 cases per 100,000 at the beginning of the period to 27 per 100,000 in 2004, the most pronounced decline since 1998. When the analysis is conducted exclusively on Latin America and the Caribbean, a similar downward trend is observed, but with higher incidence rates: from 46 to 38 cases per 100,000 population at the beginning and end of the period.

Tuberculosis can present at any time in life, but children and older adults are at a greater risk. However, nearly 40% of cases with positive bacilloscopy correspond to men 15–44 years old. High morbidity from tuberculosis in children is particularly relevant in public health, because it indicates the high degree of *Mycobacterium tuberculosis* transmission in the community.

The Directly Observed Treatment Short-course (DOTS)¹² in the Region has helped improve tuberculosis control since it was consistently implemented beginning in 1996. In 2004, 35 countries were applying the strategy, and at the end of that year, its coverage reached 82% of the general population of those countries. DOTS programs reported a total of 175,100 new cases and relapses in 2004, more than 95,000 of which were bacilliferous cases. These represent 59% of the estimated incidence in the Region, still far from the goal of 70% established by WHO in 2005 for this indicator. The average treatment success rate in patients following DOTS in 2003 was 82%, quite close to the goal of 85% proposed for that indicator in 2005 (Table 17 and Figure 19).

The emergence of new obstacles for tuberculosis control—such as the HIV/AIDS epidemic, multidrug-resistant tuberculosis,¹³ health sector reforms, the weakening of the health system,

and the human-resource crisis in health—facilitated WHO's launching of the Stop TB strategy (169). The strategy, which was drafted based on experiences in the countries with the implementation of DOTS, adds a comprehensive approach to tuberculosis control. It has provided the bases for the Stop TB Partnership's Global Plan to Stop Tuberculosis, 2006–2015 (170), which lays down in detail the steps to reach the MDG pertaining to tuberculosis¹⁴ and constitutes an appeal for mobilizing resources that will allow tuberculosis elimination as a public health problem in the long-term.

The Regional Plan for Tuberculosis Control, 2006–2015, is consistent with the Global Plan; its vision is a tuberculosis-free Region and its mission is to guarantee each patient with tuberculosis full access to quality diagnosis and treatment in order to reduce the social and economic burden as well as the inequity caused by this disease (171). The six strategic lines of work of the Plan are presented in Box 3.

The Region's Response within the Framework of the New Stop TB Strategy

HIV/TB Coinfection

The HIV infection epidemic has had a negative impact on the tuberculosis epidemic. First, it generates an increase in the number of tuberculosis cases, largely due to latent tuberculosis infection progressing to disease; second, case-fatality from tuberculosis is higher in patients with HIV infection or AIDS. Both situations threaten the achievements of the programs for tuberculosis control.

WHO has estimated that 10% of the Region's tuberculosis patients are also HIV-infected. This situation complicates not only the clinical treatment of patients, given the increasing access to antiretrovirals and the possible interactions between these and the tuberculostatics, but also the application of effective measures for the prevention of tuberculosis among people with HIV.

Many countries are responding to the HIV/TB coinfection problem by progressively implementing activities established by WHO to address both diseases (172). For example, with respect to epidemiological coinfection surveillance, in 2005 almost all the countries in the Region had estimates of the prevalence of HIV infection among people with tuberculosis; this prevalence goes from less than 1% in countries with early or concentrated HIV epidemics, to more than 30% in some English-speaking Caribbean countries that routinely test tuberculosis patients for HIV.

Resistance to Anti-tuberculosis Drugs

Multidrug-resistant tuberculosis also jeopardizes the success of many tuberculosis control programs, given its complex and ex-

¹²Directly Observed Treatment Short-course (DOTS) is the internationally recognized strategy for tuberculosis control. It typically has five components: 1) political commitment with sustainable and increasing financing; 2) case detection by sputum smear microscopy with quality control; 3) standardized treatment regimen, with patient supervision and support; 4) an effective pharmacological management system, and 5) a system of surveillance and evaluation, including assessment of treatment results.

¹³Multidrug resistant tuberculosis is defined as the appearance of resistance to isoniazid and rifampicin, which may be accompanied by resistance to other tuberculostatics.

¹⁴Target eight of MDG 6 states: "Halt and begin to reverse the incidence of malaria and other major diseases by 2015." In terms of tuberculosis, objective six defines the indicators of impact and implementation.

TABLE 17. Leading epidemiological and operational indicators for tuberculosis control, Region of the Americas, 2004.

	Estimated incidence, all forms ^a		New cases and relapses notified, all forms ^b		New cases of positive bacilloscopy (BK+) ^c		DOTS coverage ^d %	BK+ cases detected under DOTS ^e %	Treatment success, DOTS ^f %
	Number of cases	Rate	Number of cases	Rate	Number of cases	Rate			
Anguilla	3	25	0	0	0	0	0	ND	ND
Antigua and Barbuda	5	7	ND	ND	ND	ND	ND	ND	ND
Argentina	16,537	43	10,619	28	4,760	12	100	64	66
Bahamas	124	39	53	17	37	12	100	68	62
Barbados	31	11	19	7	19	7	100	139	100
Belize	128	49	83	31	34	13	100	60	89
Bermuda	3	4	6	9	0	0	0	ND	ND
Bolivia	19,568	217	9,801	109	6,213	69	60	71	81
Brazil	109,672	60	86,881	47	42,881	23	52	46	83
Canada	1,662	5	1,517	5	428	1	100	58	35
Cayman Islands	2	4	1	2	1	2	100	115	ND
Chile	2,567	16	2,664	17	1,297	8	95	114	85
Colombia	22,357	50	11,242	25	7,640	17	25	17	83
Costa Rica	612	14	712	17	419	10	100	153	94
Cuba	1,119	10	782	7	454	4	100	90	93
Dominica	12	15	ND	ND	ND	ND	ND	ND	ND
Dominican Republic	7,946	91	4,549	52	2,720	31	79	71	81
Ecuador	17,101	131	6,122	47	4,340	33	64	42	84
El Salvador	3,624	54	1,406	21	926	14	100	57	88
Grenada	5	5	2	2	2	2	0	ND	ND
Guatemala	9,469	77	3,313	27	2,339	19	100	55	91
Guyana	1,050	140	603	80	164	22	42	27	57
Haiti	25,707	306	14,533	173	7,044	84	55	49	78
Honduras	5,451	77	3,282	47	2,012	29	ND	83	87

Jamaica	197	7	116	4	69	3	100	79	53
Mexico	33,529	32	15,101	14	11,214	11	92	71	83
Montserrat	0.4	9	0	0	0	0	100	0	ND
Netherlands Antilles	16		11	6	8	4	0	ND	ND
Nicaragua	3,390	63	2,220	41	1,327	25	100	87	84
Panama	1,443	45	1,691	53	882	28	92	133	74
Paraguay	4,269	71	2,300	38	1,201	20	27	21	85
Peru	49,174	178	33,082	120	18,289	66	100	83	89
Puerto Rico	191	5	123	3	65	2	100	76	66
Saint Kitts and Nevis	5	11	2	5	0	0	100	0	ND
Saint Lucia	26	16	15	9	11	7	100	93	89
Saint Vincent and the Grenadines	34	28	8	7	5	4	100	33	ND
Suriname	290	65	94	21	38	9	0	ND	ND
Trinidad and Tobago	116	9	177	14	81	6	ND	0	ND
Turks and Caicos Islands	5	20	ND	ND	ND	ND	ND	ND	ND
United States of America	13,877	5	14,517	5	5,219	2	100	85	70
Uruguay	967	28	727	21	373	11	100	86	ND
Venezuela	10,946	42	6,808	26	3,776	14	98	77	82
Virgin Islands (UK)	3	15	2	9	2	9	100	0	ND
Virgin Islands (US)	12	11	ND	ND	ND	ND	ND	ND	ND
Region	363,245	41	235,184	27	126,290	14	82	59	82

ND: No data available.

^aIncidence estimated by WHO, all forms of tuberculosis. For estimation methods, consult sources cited.

^bTotal number of cases reported to WHO, which include new cases and relapses. A new case is one that has never received treatment for tuberculosis. Relapse is defined as a case that has been declared cured of tuberculosis with negative microscopic examination and presents the disease again with positive bacilloscopy. Rate per 100,000 population.

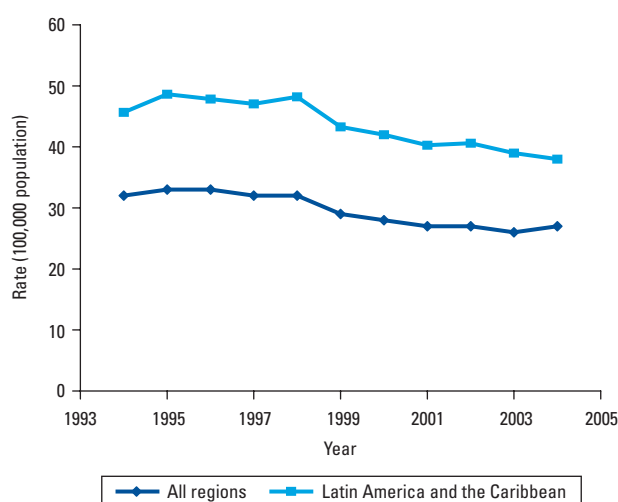
^cTotal number of cases with positive bacilloscopy in sputum. Rate per 100,000 population.

^dPercentage of population that live in a geographical location whose health facilities apply the DOTS strategy.

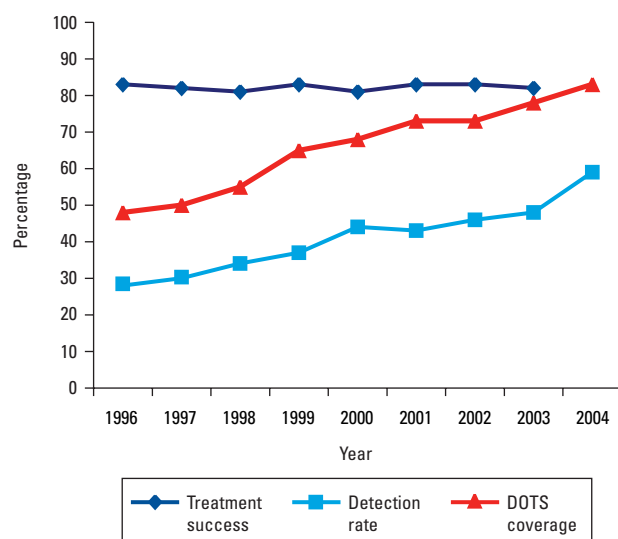
^ePercentage of cases detected by BK+ under the DOTS programs. Estimation methods are described in the sources cited.

^fPercentage of treatment success of BK+ cases under DOTS. Estimation methods are described in the sources cited.

Source: Tuberculosis Control: surveillance, planning, financing. WHO report 2005. Geneva; 2006. (WHO/HTM/TB/2006.362).

FIGURE 18. Trend in reported tuberculosis incidence, all forms, Region of the Americas, 1994–2004.

Source: World Health Organization. Global Tuberculosis Control: surveillance, planning, financing. WHO report 2005. Geneva; 2006. (WHO/HTM/TB/2006.362).

FIGURE 19. Leading indicators of tuberculosis control, Region of the Americas, 1996–2004.

Source: World Health Organization. Global Tuberculosis Control: surveillance, planning, financing. WHO report 2005. Geneva; 2006. (WHO/HTM/TB/2006.362).

pensive diagnosis and treatment. The estimated prevalence of this type of tuberculosis is higher in those populations that lack access to the DOTS strategy and among the vulnerable population groups. It is estimated that there are more than 11,000 cases of multidrug-resistant tuberculosis in the Americas, although the case burden varies from country to country. The average prevalence of primary resistance to any tuberculosis drug is 11%

(ranging between 3.2% and 41%) and that of multidrug-resistant tuberculosis is 1.2% (between 0.3% and 6.6%). The average prevalence of secondary multidrug-resistant TB is 26% (ranging from 3% to 31%) (Table 18).

All of the Region's countries are working to confront drug resistance. Belize, Bolivia, Costa Rica, the Dominican Republic, Ecuador, El Salvador, Haiti, Honduras, Mexico, Nicaragua, Paraguay, and Peru have put in place projects to address multidrug resistance that have been approved by the Light Green Committee. This committee controls access to second-line quality drugs at a lower cost and controls for their rational use; provides technical assistance; and facilitates the adoption of internationally accepted policies for the medical care of multiple-drug resistance in low- and middle-income countries. Preliminary data indicate that a cure rate of 61% to 82% is achieved worldwide for multidrug-resistant tuberculosis cases, with proven cost-effectiveness measured in DALYs, in Estonia, Peru, the Philippines, and Russia (173).

The improper use of second-line drugs generates resistance to them; in tuberculosis this problem is called extreme drug-resistance (TB-XDR), for which a world alert is currently in place.

Strengthening the Health Systems

The Practical Approach to Lung Health initiative aims to improve the quality of care of patients with respiratory symptoms, strengthen primary health care services, and, indirectly, contribute to the sustainability of tuberculosis control programs in countries with low prevalence (174). Currently, 20 countries in the world, four of them in the Americas (Bolivia, Chile, El Salvador, and Peru), are carrying out activities related to this initiative. The initiative's feasibility study in Bolivia (2005) showed that 23% of patients that go to the health services do so due to respiratory symptoms; 90% of them have acute respiratory infections, and 0.4% have tuberculosis. Thanks to the approach proposed in this initiative, hospital referrals decreased 35% and the use of antibiotics, 16%. There was a 32% reduction in the total cost of prescribed medication and 37% in that of antibiotics. These results are similar to those in other countries (175).

Leprosy

The Strategic Plan for the Elimination of Leprosy, 2000–2005, whose goal is to achieve a prevalence rate lower than one case per 10,000 population by the end of 2005, has succeeded in increasing the coverage of the control activities in every country of the Region. In fact, with the exception of Brazil, every country achieved the goal of elimination of leprosy before 2002. The Plan evolved into the Global Strategy, 2006–2010, to Reduce the Burden of Leprosy and Sustain Leprosy Control Activities (176), which is endorsed by the partners that support leprosy control programs worldwide. In addition, the strategy aims to further reduce the disease burden due to leprosy by providing comprehensive care with equity and justice for every case.

BOX 3. Regional Plan for Tuberculosis Control, 2006–2015: Strategic Lines of Work

Strategic Line 1. Expand and strengthen the DOTS strategy, ensuring its quality.

Strategic Line 2. Implement and/or strengthen:

- TB and HIV/AIDS interprogram collaborative activities.
- Prevention and control activities for multidrug-resistant tuberculosis.
- Community strategies for neglected populations (for example, indigenous people, prisoners, peri-urban over-looked populations).

Strategic Line 3. Strengthen the health system, emphasizing primary care, a comprehensive approach to respiratory diseases, the laboratory network, and the development of human resource policies for tuberculosis control.

Strategic Line 4. Improve the population's access to tuberculosis diagnosis and treatment by including all public and private health care providers.

Strategic Line 5. Empower the affected persons and the community by implementing advocacy, communication, and social mobilization strategies in TB control activities.

Strategic Line 6. Include operational, clinical, and epidemiological research in national TB control program plans.

TABLE 18. Prevalence of primary and secondary resistance to antituberculosis drugs, selected countries, Region of the Americas, 1994–2005.

Country	Year	Global ^a	Resistance		
			Primary multidrug resistance ^b	Secondary multidrug resistance ^b	Combined multidrug resistance ^b
Argentina	1999	10.2	1.8	9.4	3.1
Bolivia	1996	23.9	1.2	4.7	2.1
Brazil	1995	8.6	0.9	5.4	1.3
Canada	2000	8.5	0.7	3.4	0.9
Chile	2001	11.7	0.7	4.8	1.4
Colombia	2005	11.78	2.38	31.4	8.8
Cuba	2000	5	0.3	2.6	0.5
Dominican Republic	1994	40.6	6.6	19.7	8.6
Ecuador	2002	20	4.9	24.3	7.2
El Salvador	2001	5.7	0.3	7	0.8
Guatemala	2002	34.9	3	26.5	7.4
Honduras	2002	17.2	1.8	6.9	2.0
Mexico ^c	1997	14.1	2.4	22.4	7.3
Nicaragua	1997	15.6	1.2	—	—
Paraguay	2002	11.1	2.1	4	—
Peru	1999	18	3	12.3	4.3
Puerto Rico	2001	12	2	—	—
United States of America	2001	12.7	1.1	5.2	1.4
Uruguay	1999	3.2	0.3	—	—
Venezuela	1998	7.5	0.5	13.5	1.7

^aGlobal resistance: percentage of tuberculosis strains resistant to any tuberculostatic.

^bMDR: multidrug resistance, defined as the appearance of resistance to isoniazid and rifampicin, which may be accompanied by resistance to other tuberculostatics.

^cStudy conducted in three states.

Source: Results of MDR national surveys, published in: Antituberculosis Drug Resistance in the World. First Global Report, WHO/TB/97.229; Antituberculosis Drug Resistance in the World. Second Global Report, WHO/CDS/TB/2000.279; Antituberculosis Drug Resistance in the World. First Third Global Report, WHO/HTM/TB/2004.343.

TABLE 19. Profile of newly recorded cases of leprosy, countries that reported more than 100 cases, Region of the Americas, 2005.

Country ^a	Number of cases reported	Multibacillary cases (%)	Cases in women (%)	Cases in children (%)	Grade II disability cases (%)
Argentina	484	79.1	40.9	1.3	1.6
Brazil	38,410	50	46.3	8.4	4.9
Bolivia	114	35.9	41.2	9.6	1.7
Colombia	585	68.7	—	3.2	9.7
Cuba	208	83.1	44.7	3.8	3.3
Dominican Republic	155	63.8	50.3	16.1	3.2
Ecuador	116	62.9	35.3	0	0
Mexico	289	75.4	37.3	2.7	11.7
Paraguay	480	77.7	38.5	3.9	7.9
Venezuela	768	64.5	33.9	7.2	6.1

^aCountries that reported more than 100 cases in 2005.

Source: Annual leprosy reports from the countries, 2005.

In 2005, the Region registered a prevalence rate of 0.39 per 10,000 population and a detection rate of 4.98 per 100,000 population. Upon analyzing the profile of new cases recorded in 2005 in countries reporting more than 100 cases (Table 19), a great variety in the proportion of multibacillary cases is observed, ranging from 36% in Bolivia to 83% in Cuba. The variation in the proportion of children under 15 affected by the disease ranges from 1% in Argentina to 16% in the Dominican Republic. This indicator deserves special attention, since the proportion of grade II disability is an indicator of timely detection. There is currently great variation in this percentage, ranging from the lowest (1.6%) registered in Argentina to the highest (11.7%) in Mexico. The proportion of new cases with grade II disability and that of younger children are two indicators that allow for the characterization of the endemic disease.

In the Region of the Americas, significant achievements have been observed in leprosy control. In addition to having reached the goal of eliminating the disease before 2002 in almost every country, the Strategic Plan for the Elimination of Leprosy in the Americas has attained:

- The political commitment of countries with a high burden of disease.
- The diagnosis of more than 200,000 cases, which have already completed their treatment in 2000–2005.
- A policy of integrating leprosy control measures into the general health services, which is being implemented in 75% of the Region's countries.
- The reduction of registered cases in children under 15 from 10% in 2000 to 8% in 2005.
- A 30% reduction of new cases with grade II disability between 2000 and 2005.
- Greater participation of governmental and nongovernmental organizations (NGOs) in control activities.

The ongoing efforts to control leprosy will be strengthened by the implementation of the Global Strategy to Reduce the Burden of Leprosy and Sustain Leprosy Control Activities (Box 4). In the Region, the health authorities of some endemic countries (Costa Rica, the Dominican Republic, Ecuador, El Salvador, Paraguay, Peru, and Uruguay) began to develop an implementation strategy tailored to the epidemiological situation in each country.

CHRONIC NONCOMMUNICABLE DISEASES

Cardiovascular diseases, chronic obstructive respiratory diseases, cancer, and diabetes mellitus are the chronic noncommunicable diseases of greatest interest for public health in Latin America and the Caribbean (177, 178). In both subregions, noncommunicable chronic diseases are responsible for two out of three deaths in the general population (177) and nearly one-half of deaths among those under 70 years old (179). This group of disorders is the leading cause of mortality in men and women, and continues to increase at an extremely fast pace worldwide and in Latin America and the Caribbean (177). Of the 3,537,000 deaths registered in Latin America and the Caribbean in 2000, 67% were caused by these chronic diseases. Ischemic heart disease and cancer accounted for the majority of deaths in those 20–50 years old. Noncommunicable diseases contributed 76% of the DALYs to the overall disease burden.

In addition to early mortality, chronic noncommunicable diseases lead to complications, sequelae, and disability that limit functionality and productivity. Furthermore, these diseases require onerous treatments at enormous financial and social costs that undermine resources in both the health systems and social security. For example, the cost of diabetes in Latin America and the Caribbean in 2000 was estimated at US\$ 65.2 billion, of which US\$ 10.7 billion were direct costs and US\$ 54.5 billion, indirect costs (180). Direct and indirect diabetes costs in the United States

BOX 4. Main Objectives of the Global Strategy to Reduce the Leprosy Burden and Sustain Leprosy Control Activities

- Provide high-quality services to all persons affected by leprosy.
- Improve cost-effectiveness by decentralizing leprosy control activities and integrating them into primary care services.
- Sustain political commitment and increase control activities in collaboration with all partners at the global, regional, and national levels.
- Strengthen surveillance, monitoring, and supervision components.
- Build capacity among health workers in integrated setting.
- Enhance advocacy efforts in order to reduce the stigmatization and discrimination against persons affected by leprosy and their families.

were estimated at US\$ 132 billion in 2002, and the medical care for chronic diseases represents 75% of the total health care cost in the country (181). In Mexico in 2006, it was estimated that the cost of hospitalization services for hypertension and diabetes mellitus exclusively, was higher than the cost of hospital and outpatient services for most infectious diseases (182). A 2002 study in Jamaica estimated the costs associated with diabetes and hypertension at US\$ 33.1 million and US\$ 25.6 million, respectively (183).

Primary prevention of chronic diseases could reverse their cost to the health care systems and to individuals. It is estimated that if only 10% of adults in the United States increased their physical activity by walking regularly, for example, US\$ 5.6 billion could be saved in heart disease related costs (184).

Cardiovascular Diseases

These diseases (which include ischemic heart disease, cerebrovascular disease, hypertensive disease, and heart failure) represented 31% of the mortality burden and 10% of the total disease burden in the world in 2000 (177). The age- and sex-adjusted mortality rate for cardiovascular diseases (Figure 20) was highest in Nicaragua, the Dominican Republic, and Trinidad and Tobago, exceeding 200 per 100,000 population. The rate in Barbados, Canada, Chile, Costa Rica, Ecuador, El Salvador, Mexico, Peru, and Puerto Rico was below 150 per 100,000 population.

The latest available data (2000–2004) show that mortality from diseases of the circulatory system was higher in men (223.9 per 100,000 population) than in women (179.3 per 100,000). There also are vast differences among the subregions, from 35 to 50 per 100,000 population in Mexico and Central America, respectively, to 170 per 100,000 in North America (185).

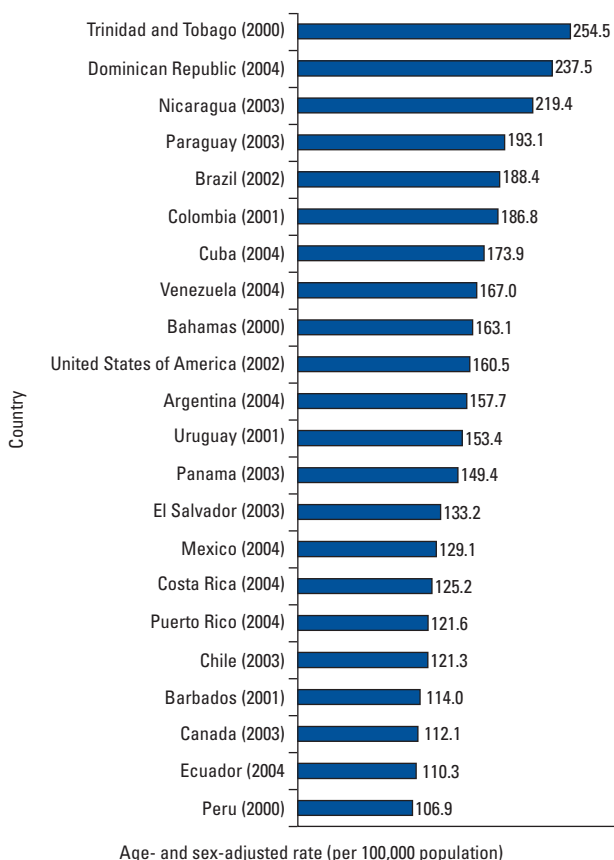
A study that compared mortality trends for cardiovascular diseases in 10 Latin American countries between 1970 and 2000 found a strong and steady decline in mortality from coronary

and cerebrovascular diseases in Canada and the United States. In Latin American countries in the same period, however, a decline in mortality from ischemic heart disease was reported only in Argentina, and a decline in mortality from cerebrovascular diseases only in Argentina, Chile, Colombia, Costa Rica, and Puerto Rico. The same study found less pronounced drops in mortality from ischemic heart disease in Brazil, Chile, Cuba, and Puerto Rico, and mortality from that cause increased in Costa Rica, Ecuador, Mexico, and Venezuela. That increase could be the consequence of unfavorable changes occurring in most Latin American countries with respect to the risk factors for this disease, such as improper diet, obesity, lack of physical activity, and smoking, in addition to a somewhat ineffective hypertension control and disease management (186).

A study on the risk for acute myocardial infarction conducted in four Latin American countries, found that high serum cholesterol, smoking, hypertension, high body mass index, and a family history of coronary heart disease were, as a whole, responsible for 81% of all cases of acute myocardial infarction in Cuba, 79% in Argentina, 76% in Venezuela, and 70% in Mexico (187).

Stroke claimed 271,865 lives in 27 countries in the Region in 2002 (187). The burden of stroke ranged between 5 and 14 potential years of life lost due to disability per 1,000 population. This figure was higher in the countries of the Americas than in most countries of the developed world. Stroke was the leading cause of death in Brazil in 2003; Mexico and Central America had the lowest mortality rates from that disease. In nearly all the subregions of the Americas, mortality from cerebrovascular disease was higher in women than in men. Mortality due to stroke dropped 10%–49% between 1970 and 2000 in most Latin American and Caribbean countries, with the exception of Mexico and Venezuela, whose mortality from stroke remained unchanged. In Canada and the United States, on the other hand, there was a more pronounced drop, around 60%, between the same years. Mortality from cerebrovascular diseases in 2000 was between twice and

FIGURE 20. Mortality from cardiovascular diseases,^a adjusted by age and sex, selected countries, Region of the Americas, latest available year.



^aIncludes ICD-10 codes I20 to I25, I60 to I69, I10 to I15, and I50.

Source: PAHO, Health Analysis and Information Systems, Regional Mortality Database, 2006.

four times greater in Latin America and the Caribbean than in the United States (186). The reasons for these differences are not well known, although it is suspected that there are significant differences in the incidence of cerebrovascular events, access to services, quality of medical care for stroke, and risk-factor control.

Malignant Neoplasms

In 2005, there were 7.6 million estimated deaths due to cancer worldwide; in other words, 13% of all deaths and 21.6% of deaths from chronic diseases. Cancer is responsible for 5% of the total burden of disease worldwide. Mortality from malignant neoplasms of lung and breast in women increased in most Latin American countries between 1970 and 2000. For example, between 1970 and 1994, mortality from breast cancer in Costa Rica rose from 6.97 per 100,000 women to 13.42; in Cuba, from 12.33

per 100,000 to 15.82; in Mexico, from 4.99 to 9.04; and in Argentina, from 18.64 to 20.99. In contrast, mortality from breast cancer in North America declined between 1985 and 2000.

In 2002, Uruguay had the highest mortality from all malignant neoplasms in men, with an age-adjusted rate of 193.3 per 100,000. This rate was higher than that of Canada and the United States, which had rates of 156.6 and 152.6 per 100,000, respectively, similar to those of Argentina. Peru and Colombia had the highest age-adjusted cancer mortality rates in women, with 146.4 and 122.5 per 100,000, respectively. The lowest total mortality rates from cancer in men were found in El Salvador, Mexico, and Nicaragua; the lowest in women were found in Brazil and Mexico (Figures 21 and 22). In Argentina and Chile, mortality from cancer in men showed a downward trend between 1970 and 2000, while it increased in Colombia and Cuba (188).

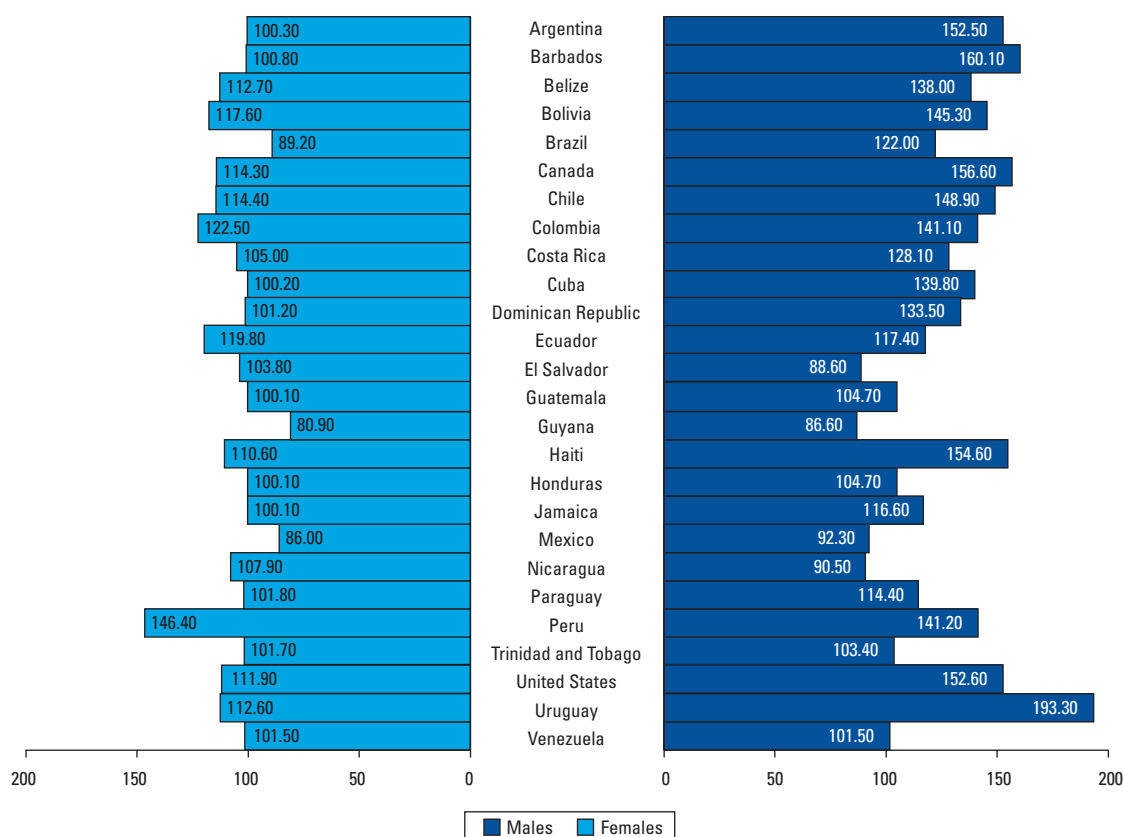
Malignant Neoplasms of Bronchus and Lung

In 2002, Uruguay and Cuba had the highest age-adjusted mortality rates of malignant neoplasms of bronchus and lung in Latin America, 48.1 and 38 per 100,000 population, respectively. The lowest rates were registered in El Salvador and Guyana (5.7 and 7.2 per 100,000, respectively). Mortality from lung cancer in women increased between 1970 and 2000. These trends correlate with smoking patterns in Latin American men and women (188–189). On the other hand, mortality from lung cancer in women in Latin America and the Caribbean (10, per 100,000) was significantly lower than that in North America (26.7 per 100,000). In Argentina, mortality from lung cancer in women rose from 5.8 per 100,000 women in 1970 to 6.43 in 1994; in Chile during the same period, mortality from lung cancer rose from 5.48 to 6.37 per 100,000 and in Mexico, from 3.93 to 5.92 per 100,000.

Malignant Neoplasm of Stomach

Mortality from stomach cancer was very high among men in most Latin American countries in 2002, with rates above 11 per 100,000 in the Caribbean and Central America, and higher than 18 per 100,000 population in South America.

Among the countries with highest mortality are several in the Andean Area—Colombia (15.7 per 100,000 in women, 27.8 per 100,000 in men), Ecuador (22.1 per 100,000 in women and 31 per 100,000 in men), and Peru (24.1 per 100,000 in women, 29.5 per 100,000 in men). Chile's high rates (32.5 per 100,000 in men and 13.2 in women) are similar to those of Costa Rica (30.1 per 100,000 in men, 17.0 per 100,000 in women). Although the rates of countries such as Cuba and Mexico were below 10 per 100,000 population, they were higher than those observed in the United States (4.2 per 100,000 in men and 2.2 per 100,000 in women). Mortality from stomach cancer in the most Latin American countries declined steadily between 1970 and 2000, probably due to changes in diet, improvements in food preservation and refrigeration, and a reduction in the prevalence of *Helicobacter py-*

FIGURE 21. Cancer mortality rates (per 100,000 population), by sex, Region of the Americas, 2002.

Source: GLOBOCAN 2002 database, International Agency for Research on Cancer.

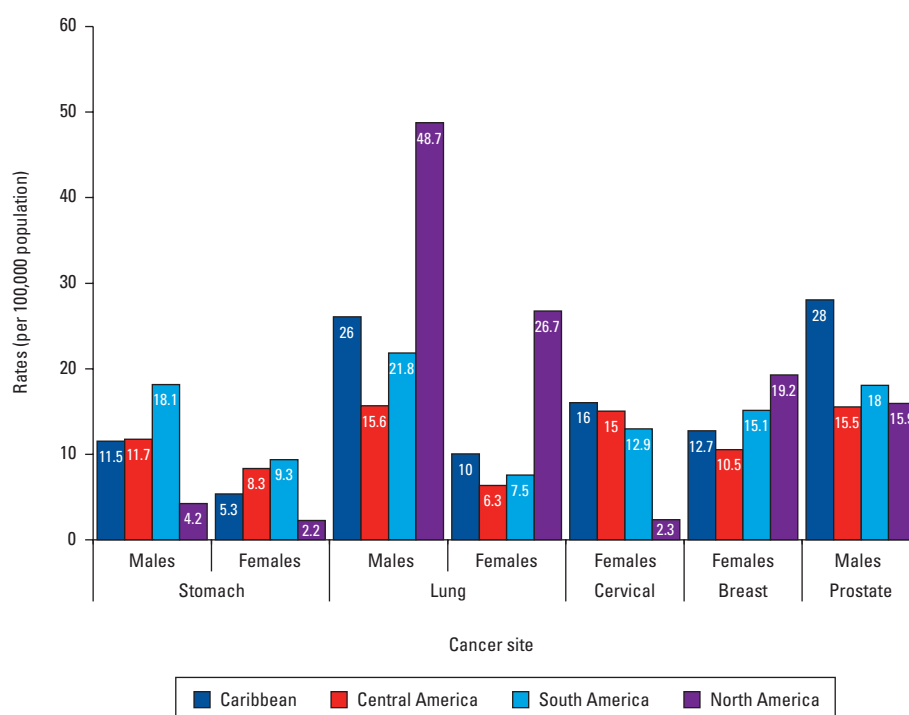
lori infection, as well as a possible reduction in smoking among men (188, 190).

Malignant Neoplasms of the Cervix and of the Breast

Cervical cancer remains as one of the leading causes of death for women in many parts of the world, despite the introduction of early detection programs more than 30 years ago. Latin America and the Caribbean recorded 71,862 new cases and 32,639 deaths from this cause in 2002 (189), some of the highest figures in the world. The age-adjusted mortality rates for the Region in 2002 were close to 15 per 100,000 women in the Caribbean and Central America, nearly 13 per 100,000 in South America, and much higher than the rate of 2.3 per 100,000 in North America. It is alarming that this detectable disease can have such a high mortality as Bolivia's (30.4 per 100,000 women), Haiti's (48.1), Nicaragua's (22.3), and Paraguay's (24.6).

Breast cancer has high mortality rates among women in the Caribbean and South American countries. In 2002, the highest age-adjusted mortality from breast cancer was found in Barba-

dos (25.5 per 100,000 women), Uruguay (24.1), and Argentina (21.8). In North America, rates hovered around 19.2 per 100,000. In recent years, mortality from breast cancer in women increased in most of the Latin American and Caribbean countries, especially in those that had the lowest rates, such as Colombia (5.2 in 1969 to 9.1 in 1994), Costa Rica (7.0 in 1970 to 12.7 in 1995), and Mexico (4.9 in 1970 to 9.5 in 1994). Trends were stable in Chile and Cuba. In North America, mortality from breast cancer declined from 23.8 per 100,000 in 1970 to 22.0 per 100,000 in 1994 in Canada, and from 22.5 in 1970 to 20.7 in 1994 in the United States (189, 190). Between 1963 and 1982, nine studies in Europe and Canada have shown that mammography, as a method to screen for breast cancer in women 50–69 years old, has been effective in reducing mortality by 23% (191). In the United States, Australia, and some European countries, it is recommended that physicians conduct case-by-case evaluations in order to determine the desirability recommending mammographies for women 40–49 years old (189). The relatively high ratios between mortality and incidence in many Latin American and Caribbean

FIGURE 22. Cancer mortality rates, by cancer site and sex, Region of the Americas, 2002.

Source: GLOBOCAN 2002 database, International Agency for Research on Cancer.

countries show that breast cancer cases are not being adequately treated, indicating the need to provide ample access to appropriate diagnostic and therapeutic services (191).

Malignant Neoplasm of Prostate

The Caribbean and South America present extremely high age-adjusted mortality rates from prostate cancer, 28.0 and 18.0 per 100,000, respectively; the rate in Canada was 16.6 per 100,000, and in the United States, 15.8 per 100,000. In 2002, the highest mortality from prostate cancer occurred in Barbados (55.3 per 100,000), Belize (35.2), and the Dominican Republic (42.2), followed by Costa Rica, Guyana, Peru, and Uruguay, with rates close to 20 per 100,000. The lowest mortality was found in El Salvador and Mexico, comparable to that in North America at around 15 per 100,000. Between the 1970s and 2000, there was an increase in mortality from this cause in all Latin American countries, especially in Costa Rica and Mexico.

Diabetes

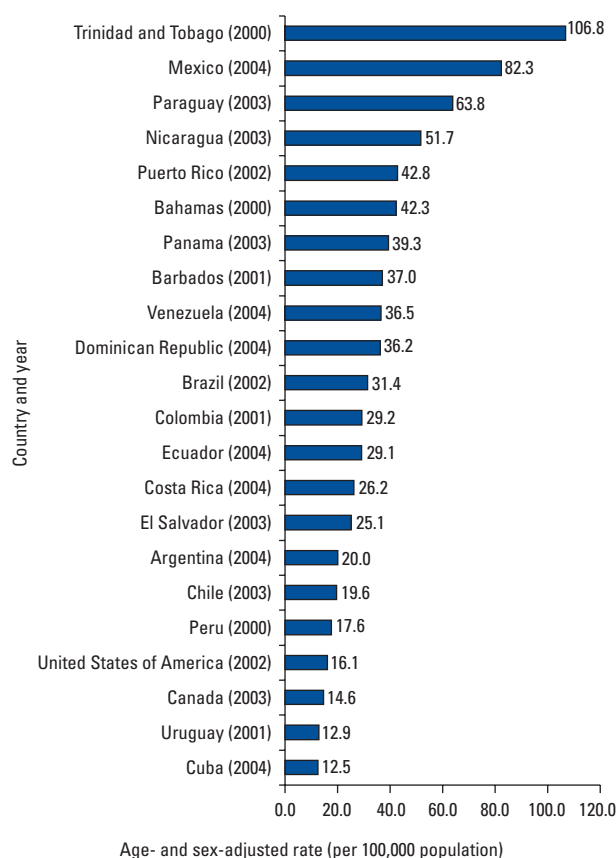
Diabetes mellitus was the fourth cause of death in Latin America and the Caribbean in 2001, accounting for 5% of total deaths (185). In Mexico it was the leading cause of death in the total population in 2002, with 12.8% of deaths (it was the leading cause among women, with 15.7%, and the second in men, with

10.5%). The highest diabetes mortality rates in the Americas (circa 2002) were in Mexico and in the non-Latin Caribbean (60 and 75 per 100,000, respectively) (179).

The estimated number of people with diabetes in Latin America was 13.3 million in 2000, a figure that is expected to reach 32.9 million by 2030 (more than doubling the number of cases) as a consequence of the aging of the population and urbanization (192). Given the increase in the prevalence of obesity in many of the world's countries, and obesity's importance as a risk factor for diabetes, the number of cases in 2030 could, in fact, be much higher (192). Even if the prevalence of obesity were to remain unchanged until 2030, it is estimated that the diabetes epidemic would continue. In the United States, the increase in the prevalence of diabetes has been explained by a similar increase in the proportion of obese persons, rather than by an increase in the absolute risk for presenting diabetes (193). According to the American Diabetes Association, people whose fasting blood sugar is between 100 mg/dl and 126 mg/dl are classified as having altered blood glucose values, or prediabetes, a term that indicates a greater risk of presenting the disease clinically. Prediabetes is also related to the metabolic syndrome, which also includes obesity or accumulation of abdominal fat, lipid disorders, and hypertension (194).

In the 1990s, there was an increase in the prevalence of diabetes and prediabetes in children and adolescents in the United States. This rise has been attributed to an increase in obesity due

FIGURE 23. Mortality from diabetes mellitus,^a adjusted by age and sex, selected countries, Region of the Americas, latest year available.



^aIncludes ICD-10 codes E10–E14.

Source: PAHO, Health Analysis and Information Systems, Regional Mortality Database, 2006.

to dietary changes and to a considerable reduction in physical activity among youth (195). Similar changes are taking place in Latin American and Caribbean countries, although the prevalence of obesity in children and adolescents has not yet reached the magnitude reported in the United States. In some localities in the north of Mexico, however, obesity rates are close to those observed in the United States (196).

The underreporting of mortality from diabetes is well known (180, 197). This is due to the fact that when people with diabetes die, the direct cause of death registered is often one of its chronic complications, such as cardiovascular disease or nephropathy. The latest available data indicate that the highest age-adjusted mortality rates from diabetes mellitus were observed in Mexico and Trinidad and Tobago; the lowest were found in Cuba, Canada, the United States, and Uruguay (Figure 23).

A study carried out in people aged 60 and older in seven Latin American and Caribbean cities found a self-reported prevalence of diabetes of 15.7%; the highest corresponded to women in

Bridgetown, Barbados (21.3%) and the lowest to men in Buenos Aires, Argentina (12.0%). In addition, a strong association was found between the prevalence of diabetes, and the body mass index (BMI) and lower educational levels (198).

Table 20 shows the crude and standardized prevalence of diabetes, hypertension, and overweight in adult populations, according to studies conducted in Barbados (199), Belize (200), Canada (201), Chile (202), Costa Rica (203), El Salvador (204), the United States (205–207), Guatemala (208), Haiti (209), Honduras (210), Mexico (211–213), and Nicaragua (214). According to studies carried out in persons 20 years old and older (Table 20), the adjusted diabetes prevalence was higher in Belize (15.3%), Nicaragua (11.9%), and Costa Rica (10.7%); the United States (9.3%), El Salvador (9.8%), and Honduras (8.0%) had prevalence rates higher than 7% but lower than 10%, whereas Chile and Haiti had prevalence rates of 7%. The Barbados study carried out in persons 40 years old and older (199), using glycosylated hemoglobin (A1c) as a diagnostic test, found a 19.4% crude prevalence of diabetes (18.6% standardized). The prevalence increased with age for both women and men, and was higher in women. Further, a study conducted in the United States-Mexico border region found that 15.7% of the respondents suffered from diabetes (215).

Chronic Respiratory Diseases

In Latin America and the Caribbean these diseases caused 3% of all deaths. The latest available data in the Region (circa 2000) indicate that mortality from chronic respiratory diseases ranges between 16 and 25 per 100,000 population; in most of the countries, mortality from this cause was higher among men. In the United States, the crude mortality rate in 2002 was 42.9 per 100,000 for both sexes. This group of diseases caused 2.5% of the global burden of disease in 2001, 3.5% of the burden in high-income countries, and 2.4% in low- and medium-income countries (177).

The highest age-adjusted mortality rates for chronic respiratory diseases (asthma, chronic obstructive pulmonary disease, emphysema, and chronic bronchitis) were found in Brazil, Colombia, Costa Rica, Cuba, Mexico, Nicaragua, Panama, the United States, and Uruguay, with rates between 30 and 20 per 100,000 population, according to the latest available data (circa 2000). Argentina, Belize, Canada, Chile, the Dominican Republic, El Salvador, Puerto Rico, Suriname, Trinidad and Tobago, and Venezuela had intermediate rates, between 20 and 10 per 100,000. The lowest rates were in the Bahamas, Barbados, Ecuador, Paraguay, and Peru, with fewer than 10 cases per 100,000 population.

Hypertensive Diseases

Hypertension is a major risk factor for heart disease and cerebrovascular disease. An analysis of age-adjusted mortality from hypertensive diseases (Figure 24) in selected countries of the Region shows Bahamas with the highest rate (44.8 per 100,000 pop-

TABLE 20. Prevalence of diabetes mellitus, hypertension, and overweight in adults, by sex, selected countries of the Americas, most recent available year.

...head, most recent available year.								
Country	Year	Age (years)	Crude			Standardized ^a		
			Males	Females	Total	Males	Females	Total
Diabetes mellitus								
Barbados	2002 ^b	40 and older	16.5	21.5	19.40	16.21	20.93	18.57
Belize	2006	20 and older	8.56	16.29	12.41	10.57	20.24	15.34
Chile	2003	20 and older	6.10	6.50	6.30	7.30	6.70	7.00
Costa Rica	2005	20 and older	8.30	7.60	7.90	11.52	9.97	10.67
El Salvador	2004	20 and older	7.68	7.09	7.37	10.79	9.05	9.85
Guatemala	2003	20 and older	8.84	7.72	8.23	11.30	10.05	10.65
Haiti	2002	20 and older	4.72	8.83	7.30			7.00
Honduras	2004	20 and older	6.41	5.88	6.12	8.79	7.35	8.00
Mexico	2000	20–69			10.70			14.50
Nicaragua	2004	20 and older	8.93	9.02	8.98	11.63	12.03	11.91
United States of America	2001–2002	20 and older	10.20	8.50	9.30	10.60	8.20	9.30
Hypertension								
Barbados	2002 ^b	40 and older	49.8	59.6	55.4	50.55	58.74	54.64
Belize	2006	20 and older	27.11	30.73	28.91	31.76	38.33	33.54
Chile	2003	20 and older	36.70	30.80	33.70	41.50	36.60	38.30
Costa Rica	2005	20 and older	26.13	25.04	25.57	28.57	28.05	28.30
El Salvador	2004	20 and older	21.20	21.17	21.18	24.61	24.44	24.52
Guatemala	2003	20 and older	11.97	13.92	12.96	17.99	21.86	19.96
Haiti	2003	20 and older	48.52	45.68	46.74			41.30
Honduras	2004	20 and older	23.62	21.56	22.48	25.29	24.23	24.70
Mexico	2000	20–69	34.2	26.3	30.05	30.90	36.90	33.90
Nicaragua	2004	20 and older	24.02	25.09	24.59	30.62	33.51	32.18
United States of America	1999–2002	20 and older	25.10	25.70	25.50	25.20	25.80	25.50
Overweight (BMI ≥25)								
Belize	2006	20 and older	58.64	74.56	66.57	59.93	76.15	67.99
Canada ^c	2000	12 and older	51.80	37.80	44.80	56.62	40.49	48.56
Chile	2003	20 and older	43.20	32.70	37.80	62.95	66.09	64.52
Costa Rica	2005	20 and older	62.00	55.80	58.80	67.16	58.69	62.66
El Salvador	2004	20 and older	69.56	63.09	66.17	70.93	65.12	67.89
Guatemala	2003	20 and older	54.77	63.94	59.73	55.07	66.49	61.21
Honduras	2004	20 and older	51.94	59.95	56.36	52.69	61.48	57.57
Mexico	2000	20–69	60.7	65.3	62.0			
Nicaragua	2004	20 and older	59.04	71.40	65.61	63.08	74.40	69.19
United States of America	2000–01	20 and older	70.80	61.80	66.30	69.90	60.60	65.30

Notes:

Costa Rica, El Salvador, Guatemala, Haiti, Honduras, and Nicaragua conducted studies in urban populations in their capitals. Belize's data comes from a national-level study.

Diagnostic criteria for diabetes: Barbados HbA1c > 10%, or previous diabetes diagnosis; Chile, El Salvador, Mexico, and the United States—fasting glucose level ≥ 126 mm/l or previous diabetes diagnosis; Belize, Costa Rica, Guatemala, Haiti, and Nicaragua—two-hour glucose tolerance test ≥ 200 mm/l of fasting glucose ≥ 126 mm/l, or previous diabetes diagnosis.

Diagnostic criteria for hypertension: systolic arterial pressure ≥ 140 mm Hg, or diastolic arterial pressure ≥ 90 mm Hg, or previous hypertension diagnosis.

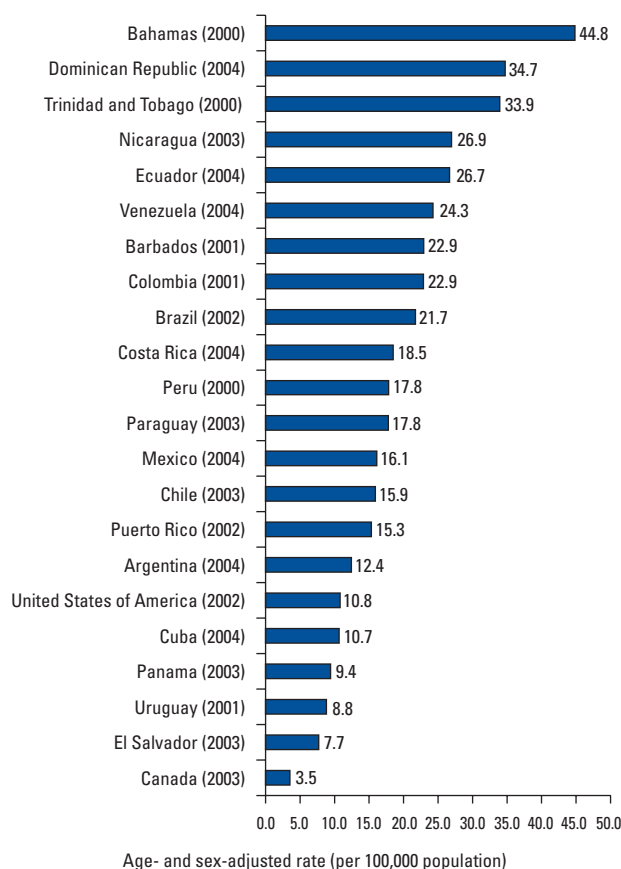
^aBy age and sex, using Segi's population as a standard (Segi, M. Kurihara. Trends in Cancer Mortality for selected sites in 24 countries, 1950–1959, Department of Public Health. Tohoku University School of Medicine, Sendai, Japan, 1963.)

^bYear published.

^cAge-standardized rates for persons 40 years old and older.

Source: Barbados (199), Belize (200), Canada (201), Chile (202), Costa Rica (203), El Salvador (204), United States (205–207), Guatemala (208), Haiti (209), Honduras (210), Mexico (211–213), and Nicaragua (214).

FIGURE 24. Mortality rates from hypertensive diseases,^a adjusted by age and sex, selected countries of the Americas, latest available year.



^aIncludes ICD-10 codes I10 to I15.

Source: PAHO, Health Analysis and Information Systems, Regional Mortality Database, 2006.

ulation) and Canada, El Salvador, Panama, and Uruguay with the lowest.

Data from several population studies in the Region (Table 20) reveal that the highest prevalence of age- and sex-adjusted hypertension among the population 20 years old and older was found in Haiti (41.3%) and Chile (38.3%); Belize, Costa Rica, the United States, Mexico, and Nicaragua presented prevalence rates between 25% and 34%, while El Salvador, Guatemala, and Honduras had prevalence rates lower than 25%. A survey and follow-up study carried out in Barbados in persons 40 years old and older, found a prevalence of hypertension of 54%; hypertension was more frequent among women and it increased markedly with age (216). In Mexico, the National Survey of Chronic Diseases and the National Health Survey showed that hypertension rose from 26% to 30% between 1998 and 2000 (217, 218). In Cienfuegos, Cuba, a prevalence of hypertension of 19.9% was reported in adults, and it was more frequent among men (219).

Inadequate blood pressure control can increase a hypertensive's risk of premature mortality. A study in Barbados (216) and another in Mexico (220) showed a high percentage of persons that were unaware that they had hypertension, as well as people with elevated blood pressure values, despite ongoing treatment. These studies also found greater general mortality from all causes among people with hypertension than among the general comparable population.

Risk Factors for Chronic Noncommunicable Diseases

Several risk factors common to many noncommunicable diseases (such as diabetes, cardiovascular diseases, and several forms of cancer) can be modified; the most important ones are an unhealthy diet, lack of physical activity, smoking, and alcohol abuse (221). In turn, those factors are manifested through others of intermediate risk, such as hypertension, hyperglycemia (diabetes and pre-diabetes), hypercholesterolemia (especially low-density lipoproteins), overweight, and obesity. The risk factors subject to modification, together with those that cannot be modified, such as age and heredity, explain the majority of the chronic diseases. All these factors are determined by demographic, social, cultural, political, and economic conditions, such as poverty, urbanization, globalization, and the population's structure and dynamics (222). The likelihood of success of preventive actions increases considerably when these factors are targeted (180, 201, 223–225).

Tobacco Use

Smoking is linked to several diseases, including lung and other types of cancer, heart disease and cerebrovascular diseases, emphysema, and peripheral vascular disease, (226, 227). Smoking is also harmful to pregnancy.

WHO has estimated that half of the current smokers (650 million people) will die between the ages of 35 and 69. It is estimated that tobacco caused 100 million deaths in the 20th century, and it is expected to cause one billion deaths in the 21st century (226). In the United States, cigarettes are responsible for more than 440,000 deaths per year, or one of every five deaths. Of these, nearly 10% occur as a result of exposure to second-hand smoke. All cancer cases caused by smoking could be prevented. At least 30% of all cancer deaths in the United States are due to smoking; furthermore, it is estimated that the habit is responsible for eight out of ten lung cancer cases. Some 8.6 million people have at least one serious disease caused by cigarette smoking. In the United States, the direct and indirect costs of the diseases associated with cigarette smoking total more than US\$ 157 billion annually (227). Smoke also poses a serious threat to the health of non-smoking adults and children exposed to cigarette smoke—in the United States alone, cigarette smoke is responsible for the death from lung cancer of approximately 3,000 non-smokers each year (226). Among adult men, the countries with greater proportion of

smokers in the Americas are Cuba (48%), Ecuador (45.5%), Trinidad and Tobago (42.1%), and Peru (41.5%). Among adult women, tobacco use is more prevalent in Venezuela (39.2%), Argentina (34%), Brazil (29.3%), and Cuba (26.3%). Among adolescents 13–15 years old, smoking is more prevalent among males in Chile (34%), Bolivia (31%), and Peru (22%); it is more prevalent among females in Chile (43%), Argentina (30%), and Uruguay (24%). For all the countries, prevalence is higher in males than in females, both for adults and adolescents (228).

According to the United States risk factor surveillance system, in 2002, 23% of adults in that country (25% of men and 20% of women) claimed to be current smokers (defined as having smoked at least 100 cigarettes during their lifetime and currently smoking every day or some days). In 2001, 28.5% of high school students who participated in a survey reported having smoked cigarettes one or more days during the 30 days prior to the survey; the survey also reported that the average age at which they started smoking was 15.4 years (227). In 2000, 21.5% of Canadians 12 years old and older were daily smokers (201).

Diet and a Lack of Physical Activity

More than half the population of the Americas is sedentary, defined as not engaging in the recommended minimum of 30 minutes of moderate physical activity per day at least five days a week. In several countries, the proportion of the population whose health is at risk due to the lack of physical activity is close to 60%.

It is estimated that in Brazil, Chile, Mexico, and Peru, more than two-thirds of the population does not engage in physical activity based on levels recommended for deriving health benefits. The level of participation in physical activities is lower in women than in men; it is greater in people with higher income and it decreases with age, in both sexes (229).

In the United States in 2002, 25% of adults (28% of women and 22% of men) reported that they did not engage in physical activity during their spare time. The percentage was 37% for Hispanics, 33% for African Americans, and 22% for whites. More than three-fourths of adults (80% of men and 71% of women) reported that they did not consume the recommended daily amounts of fruits and vegetables (227). Among high school students, 48% indicated that did not participate in physical education classes (44% of males and 52% of females) (227) and 79% (77% of males and 80% of females) consumed less than five servings of fruit and vegetables per day. In the United States, it is estimated that at least 300,000 deaths each year are related to improper diet and lack of physical activity (227). In Canada, according to the Canadian Community Health Survey, 53.5% of persons 12 years old and older were sedentary; a lack of physical activity was more prevalent in women (57%) than in the men (49.6%) (201). A lack of physical activity is not a problem only in developed countries. According to an adult population survey, in Guatemala City's *municipio* of Villanueva (208), it was observed

that only 25% of respondents were physically active (150 minutes or more per week of moderate physical activity).

These risk factors unfold within a social, cultural, political, and economic context that can erode the population's health, unless measures are put in place to build a health promotion environment. In many developing countries, however, food policies continue to focus only on malnutrition and do not yet target chronic disease prevention (230).

Overweight and Obesity

People who are obese, defined as a body mass index (BMI) of $\geq 30 \text{ kg/m}^2$, are at greater risk of suffering from heart disease, hypertension, diabetes mellitus, breast cancer, colon cancer, vesicular lithiasis, and arthritis (227). In 2005, more than one billion people in the world were overweight, 805 million of which were women; more than 300 million were obese. If current trends persist, it is estimated that more than 1.5 billion persons will be overweight in 2015 and the BMI will increase in almost all the countries of the world. Every year, at least 2.6 million people die because of overweight or obesity (231).

In 2005, it was estimated that the prevalence of overweight in women 30 years old and older exceeded 50% in all the countries of the Region; in some countries, such as Jamaica and other Caribbean countries, Mexico, Nicaragua, and the United States, the prevalence was higher than 75% (231). In the United States, obesity has reached epidemic proportions, doubling its prevalence in the last two decades. In 2000, the direct and indirect costs attributed to obesity in the United States were US\$ 117 billion. In that country in 2001, 11% of high school students were overweight (14% of males and 7% of females); furthermore, 14% were at risk of becoming overweight (227). In 2000, 44.8% of Canadians aged 12 years old and older were overweight (51.8% of males and 37.8% of females), which makes overweight a problem that cuts across all ages, but which mainly affects persons 35–64 years old. In addition, 19% were overweight and led a sedentary lifestyle simultaneously, and the percentage of those who simultaneously were overweight, led a sedentary lifestyle, and used tobacco was 5.3% (201).

The age- and sex-adjusted prevalence of overweight (BMI ≥ 25) for people aged 20 and older was highest in Nicaragua, El Salvador, and the United States (65% to 70%), while Chile, Costa Rica, and Guatemala presented an adjusted prevalence that ranged from 60% to less than 65%. In Honduras, the prevalence was 57.6%, and Canada presented the lowest adjusted prevalence (48.5%), although the data include people 12 years old and older (Table 20).

Hypercholesterolemia

Hypercholesterolemia is one of the major independent risk factors for heart disease and cerebrovascular disease. Total blood cholesterol levels are considered a risk factor when they reach $\geq 200 \text{ mg/dl}$. A 10% reduction in the total cholesterol levels can reduce the incidence of coronary disease by 30%. It has been es-

estimated that in 2001, 105 million citizens of the United States (30.9% of the total population; 32.2% of men and 29.8% of women) had total cholesterol levels above the standard values, and that 80% of these people were not under treatment (227). In Mexico, the 2001 and 2002 National Health Survey found a global prevalence of hypercholesterolemia of 43.3% (232).

In Argentina's 2005 National Survey of Risk Factors, 27.8% of respondents that had had their cholesterol measured reported having high levels (233). In Chile, the 2003 Health Survey found a prevalence of elevated total cholesterol of 25% (234). In 2003–2004, the Central American Diabetes Initiative carried out a multinational survey on diabetes mellitus, hypertension, and their risk factors, which showed that the general prevalence of hypercholesterolemia was 19.7% in Managua, Nicaragua (214), 45.7% in San José, Costa Rica (203), and 35.5% in Villa Nueva *municipio*, Guatemala (208).

Alcohol Abuse

Alcohol abuse is considered a risk factor for cardiovascular diseases such as hypertension, stroke, and diabetes. A national study conducted in Canada (2000) found a prevalence of this risk factor of 7.8% for men and 4.3% for women (201). In Argentina (2005), 9.6% of regular alcohol consumption (defined as an average of more than one glass per day among women or two drinks per day among men) and 10.1% of excessive episodic alcohol consumption (defined as the consumption of five or more drinks on a single occasion on at least one day in the 30 days prior to the interview) (233). In a population study carried out in 2004 in Managua, Nicaragua, it was found that 18% (36% of men and 7.9% of women) reported having consumed five or more alcoholic beverages at least once in the four weeks that preceded the interview (214).

Educational Level and Economic Status

Having a low educational level has been used as an indicator of inequity in the Region of the Americas. Several studies have shown that people with little formal education are at a greater risk for noncommunicable diseases (198, 233–235). Diabetes has been related to low educational levels in many population studies of adults (234, 235) and older adults (198). Chile's 2003 National Health Survey also showed that the prevalence of hypertension, obesity, sedentary lifestyle, and chronic respiratory tract diseases was significantly higher among people with low educational levels.

People with lower incomes are more vulnerable to noncommunicable diseases and their consequences. In Argentina, according to the National Survey of Risk Factors, the proportion of people with hypertension or with poorly controlled blood pressure (blood pressure >140/90, with treatment) was greater in low-income groups and among those without social security coverage (233). Likewise, studies carried out in adults in several cities of Peru showed that a higher level of education and access to health information offers protection against overweight in

women; it also found that as the socioeconomic status decreases, the prevalence of several risk factors (such as high cholesterol, diabetes, overweight, and obesity) for chronic diseases increases. The relative risk of presenting cardiovascular disease in the lowest socioeconomic strata was four times higher than that in the highest strata (236, 237). Other studies conducted in Brazil, Chile, and Peru showed that people in lower-income groups were the least likely to engage in physical activity (229).

The incidence of and mortality from cervical cancer was also related to poverty, limited access to services, rural residence, and low educational levels, as well as to cultural and psychosocial aspects. For example, an analysis carried out in 2004 found that in Ecuador, incidence rates and mortality from cervical cancer were higher among women of the poorest sectors, especially those in rural areas. In Bolivia, wide variations in the incidence and mortality from cervical cancer within the country were related to the access to services, the educational level, and poverty (238).

The Health System's Response

Available information, although limited, indicates that chronic diseases constitute an enormous and growing health problem for Latin America and the Caribbean. The cost-effective strategies for the prevention and control of noncommunicable diseases are well known and well documented. The integrated responses to noncommunicable diseases include a combination of a population strategy (healthy public policies, media campaigns, social marketing, and reorientation of the health services) and an individual strategy (management of both risk factors and chronic noncommunicable diseases), as well as an epidemiological surveillance system.

Although there has been some progress in the prevention and control of chronic diseases in Latin America, results have yet to be reflected in health conditions. Multisectoral strategies and the reorientation of the models of care toward prevention, risk control, and timely chronic disease treatment are still absent in all the countries of the Region. In 2001 and 2005, WHO conducted surveys to evaluate national capabilities to respond to noncommunicable diseases (239); the results indicate that some progress has been made in noncommunicable disease prevention and control in Latin America and the Caribbean. Of the 25 Latin American and Caribbean countries that responded to the 2005 survey, 81% had a department of chronic diseases in the ministry of health, compared to 59% in the 2001 survey. The proportion of countries that reported a specific budget item for chronic diseases rose from 23% in 2000 to 59% in 2005. Similarly, the proportion of countries that included noncommunicable diseases in the annual health report rose from 72% in 2000 to 96% in 2005, and those with noncommunicable disease surveillance systems in place rose from 50% in 2000 to 63% in 2005. Although a considerable number of Latin American countries seem to have surveillance systems for chronic diseases, there is little published data to evaluate the current noncommunicable disease situation

in them. Only publications from Argentina, Barbados, Brazil, Chile, and Mexico showed national data that show noncommunicable disease prevalence rates or related risk factors.

More than 80% of the countries reported having protocols for diabetes, hypertension, and cancer; 68% of the countries reported having policies for chronic diseases, mostly related to the health system or the information system. The Framework Convention on Tobacco Control and the Strategy on Diet, Physical Activity, and Health consider intersectoral population-based and noncommunicable disease risk prevention health policies. WHO's survey on national capabilities shows that only 16% of the countries had formulated plans to implement the aforementioned strategy. In Latin America, 27 countries (up to August 2006) had signed the Framework Convention on Tobacco Control. Although more than 80% of the countries signed the Convention, it is still too early to see its impact on mortality.

PROMOTING HEALTH

MENTAL HEALTH

Mental health is an area of public health that encompasses several spheres. In terms of health, it includes outreach and primary prevention; in terms of illness, it includes the recovery of mental health and the reduction of disabilities caused by mental health disorders. This section concentrates on the treatment of psychiatric disorders, as this is the target of most countries' efforts.

The Burden and Magnitude of Mental Health Disorders

Epidemiological studies conducted in the 1990s decade clearly establish a need for action in mental health. In 1990, psychiatric and neurological conditions accounted for an estimated 8.8% of DALYs in Latin America and the Caribbean; by 2002, the figure had more than doubled to 22.2% (240, 241).

Despite the extent of the burden of mental disorders, the countries' responses have been limited or inadequate. This paradoxical situation in which the burden is great and the response insufficient translates into treatment lags for mental health disorders and shortcomings in the mental health service models (241).

A review of the Region's most important epidemiological studies of health mental disorders reveals that the estimated average prevalence rate was 1% for nonaffective psychosis (including schizophrenia), 4.9% for major depression, and 5.7% for alcohol abuse or dependency. Yet, more than one-third of persons suffering from nonaffective psychosis, more than half of persons suffering from anxiety disorders, and approximately three-quarters of persons dependent on or abusing alcohol did not receive any type of psychiatric treatment at a specialized or general service (241).

Studies in several countries reveal these gaps by providing the percentage of individuals in need of treatment who did not receive it. Table 21 shows the treatment gap for various disorders in São Paulo, Brazil; Chile, and the Federal District, Mexico (242–244).

In short, only a minority of persons needing mental health services receives them, notwithstanding the extent of suffering and disability caused by mental disorders and the emotional and economic impact on families and communities. And the toll exacted by mental disorders is greater among those in the lowest socioeconomic strata, who have even less access to services.

Disasters and Mental Health

Many countries in the Region are exposed to natural disasters and internal armed conflicts, which leave psychosocial wounds and scars and raise the rates of psychiatric morbidity and other emotional problems. A study conducted in Honduras after Hurricane Mitch found elevated rates of symptoms consistent with post-traumatic stress disorder, major depression, and alcohol abuse. Among the low-income population, the prevalence rates

TABLE 21. Mental illness treatment gap,^a Brazil, Chile, and Mexico.

Disorder	São Paulo, Brazil (month preceding the survey)	Chile (six months preceding the survey)	Mexico City, Federal District (entire life)
Nonaffective psychosis	58.0	44.4	—
Major depression	49.4	46.2	43.4
Dysthymia	43.8	32.4	78.5
Bipolar disorder	46.0	50.2	74.1
Generalized anxiety	41.1	44.2	72.2
Panic disorders	47.8	22.7	70.0
Obsessive-compulsive disorder	—	27.6	92.1
Alcohol abuse or dependence	53.3	84.8	—

^aGap expressed in terms of the percentage of people in need of treatment who did not receive it.

Source: Kohn R, Levav I, Caldas de Almeida JM, Vicente B, Andrade L, Caraveo-Anduaga JJ, Saxena S, Saraceno B. Los trastornos mentales en América latina y el Caribe: Asunto prioritario para la salud pública. *Rev Panam Salud Pública* 2005; 18 (4/5): 229–240.

for these conditions were 15.7%, 25.9%, and 8%, respectively, in the three months following the disaster (245).

The Response

There are several indicators that measure the countries' responses to mental health needs. Roughly 73% of the Region's countries have national policies and plans that deal specifically with mental health, but the biggest challenge at present is implementing them. In addition, 75% have laws specific to mental health in place, although they have not been updated in all the countries. Finally, 78.1% of the countries allocate budgetary resources to mental health, but in several of them this budget accounts for only approximately 1% of the total health budget. For example, according to an exhaustive study of mental health systems in Central American countries, El Salvador, Guatemala, and Nicaragua spend 1% or less of their total health budgets on mental health, and approximately 90% of this amount goes to psychiatric hospitals (246). This pattern of spending deters the establishment of alternative, community-based mental health models.

The control of psychiatric disorders requires, among other therapeutic modalities, pharmacological and psychosocial interventions that can be offered through primary health care. However, according to the aforementioned Central American study, many health clinics do not have essential psychopharmaceuticals.

Another way of measuring country response is by gauging the number of available specialized professionals. There are two psychiatrists per 100,000 population in the Americas, which is a fraction of the number in Europe (9.8 per 100,000 population). The comparison between Europe and the Americas is more favorable in terms of psychology professionals, of whom there are 3.1 and 2.8 per 100,000 population, respectively (247).

Prospects for Change

Since 1990, with the adoption of the Declaration of Caracas, Latin American and Caribbean countries have made the restructuring of psychiatric care a key component of their strategies, with the goal of transferring the care provided in mental institutions to the community.

This transformation strategy was ratified by nearly every country in the Region in Brasilia in November 2005, at the Regional Conference on Mental Health Services Reform: "15 Years after the Caracas Declaration," which evaluated the change process. However, in four of five countries, most psychiatric beds are still in psychiatric hospitals instead of in general hospitals, and one in four countries have yet to develop community-based psychiatric care. Nevertheless, important changes have been made that suggest that reforms will continue (248).

The final declaration of the Brasilia conference states that mental health services must address the new technical and cultural challenges that have emerged over the past 15 years, such as

“Although the true magnitude of the sexually transmitted disease problem remains essentially unknown throughout the Americas, significant progress has been achieved in stimulating a new awareness of their seriousness.”

Héctor R. Acuña, 1982

psychosocial vulnerability, which includes the problems faced by indigenous communities and the adverse effects of unplanned development in the Region's large cities; the increase in morbidity and psychosocial problems among children; higher societal demand for services that allow for the adoption of effective measures for the prevention and early treatment of suicidal behavior and alcohol abuse; and growing levels of violence in its different forms, which requires the active participation of mental health services, particularly victim services.

Mental health issues have unmistakably been rising in importance on citizens' and national agendas, as demonstrated by the 2001 Resolution of the Governing Bodies of the Pan-American Health Organization on mental health issues, successful local and national experiences, the emergence of new associations of mental-health-service users and families, and increased efforts to advance the cause. There are increasingly greater opportunities for cost-efficient interventions (249), which suggests that the response, while still limited, will strengthen over time.

ORAL HEALTH

Oral health is still a critical aspect of the overall health conditions in the Americas, given its important contribution to total morbidity, high treatment costs, and inequality in oral health care. These factors are exacerbated by poor quality oral health services, limited coverage, an increase in treatment costs, and low investment in public oral health programs. Since 1995, 40 national oral health surveys have been conducted in the Americas, and their results show a decrease of between 35% and 85% in the prevalence of dental caries (250). And yet, morbidity due to oral problems in the Region remains high in comparison with other regions of the world (251). In response, strategies have been developed to reduce morbidity due to oral problems and promote more equitable access to odontological services. These strategies are based on successful fluoridation programs carried out in recent decades; the promotion of simple, cost-effective technologies; and the establishment of comprehensive health care systems that combine oral and general health services (252).

Dental Caries

In 1999, the Pan American Health Organization proposed a goal of reducing dental caries by 50% throughout the Region (253). To this end, the Organization, in cooperation with each

country, is pursuing the conduct of epidemiological surveillance of dental caries through clinical cross-sectional studies targeting specific groups (cohorts), in accordance with protocols established by WHO (254).

In 2000, WHO set the oral-health target of achieving a decayed, missing, or filled teeth (DMFT) index of under 3 among 12-year-old children, known as DMFT-12. Anguilla, Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, the Cayman Islands, Canada, Colombia, Costa Rica, Cuba, Curaçao, Dominica, Ecuador, El Salvador, Grenada, Guyana, Haiti, Jamaica, Mexico, Nicaragua, Peru, Saint Kitts and Nevis, Suriname, Trinidad and Tobago, Turks and Caicos Islands, the United States of America, Uruguay, Venezuela, and several states in Brazil achieved an average DMFT of 3. Bolivia, the Dominican Republic, and several regions of Chile, still have an average DMFT higher than 4 (255). Two geographical patterns emerge when countries in the Region are classified by the percentage of children without caries. In Belize, the Cayman Islands, Guyana, Jamaica, and the United States, for example, 40% or more of 12-year-old children have no caries. In Bolivia, the Dominican Republic, Ecuador, Honduras, Nicaragua, Panama, and Paraguay, on the other hand, the figure is between 10% and 25% (255).

Although percentage reductions of dental caries since the 1980s vary greatly (from 2.5% in the Bahamas to 89.5% in Belize), as Table 22 shows, the average DMFT-12 index has fallen in every country (255). In Guatemala, Suriname, and Trinidad and Tobago—countries that carried out surveys of oral health between 2002 and 2004—the percentage reductions in dental caries were 35.8%, 71.2%, and 87.8%, respectively, as measured against data from surveys conducted in the 1980s (Figure 25). If the trend continues, most of the Region's countries are expected to reduce the prevalence of dental caries to an average DMFT-12 below 1.5 by 2015. Gradual declines are expected in the Andean, Caribbean, and Southern Cone subregions, and a more pronounced reduction is expected in Central America (Figure 26). These projections are estimates of the percentage reduction of dental caries, calculated using data from countries that have conducted epidemiological studies at least every 10 years.

Despite the decrease in the DMFT, and particularly the caries component, major disparities between countries remain when the contribution of missing and filled teeth to the DMFT is analyzed. There is a stark contrast between countries such as the Cayman Islands, Costa Rica, and the United States, which have high percentages (49% to 71%) of filled teeth, and countries such as Bolivia, the Dominican Republic, Ecuador, Honduras, Panama, and Paraguay, where untreated teeth account for more than 80% of the DMFT (255).

PAHO has developed a typology for identifying a country's oral health profile based on the DMFT-12 and to be able to make comparisons between countries (250). This typology identifies

three stages of dental caries severity: 1) *Emerging*, defined by a DMFT-12 higher than 5 and the absence of a national fluoridation program; 2) *Growth*, defined by a DMFT-12 of 3–5 and the absence of a national fluoridation program; and 3) *Consolidation*, defined by a DMFT-12 of under 3 and the existence of a national fluoridation program. Progress in reducing dental caries is reflected in the major epidemiological changes that have occurred throughout the Region. Between 1996 and 2005 (Table 23), the number of the Region's countries that moved into the consolidation stage increased by 51.3%, and some 22% moved from the *emerging* stage to the *growth* stage, or directly to the *consolidation* stage, as was the case with Belize, El Salvador, Haiti, Nicaragua, and Peru.

Fluoridation in the Americas

The incorporation of systemic fluorides into water and salt for human consumption has been proven to be beneficial for the prevention of dental caries in several countries in the Americas and Europe (256–258). Fluoridation of drinking water has contributed significantly to the reduction in the prevalence of dental caries in North America (259); beneficial effects have also been reported from the ingestion of fluoridated salt (260–262).

In 1994, PAHO launched a multi-year Regional Plan for the Prevention of Dental Caries through Salt and Water Fluoridation. The plan was shaped by three operating principles: 1) prevention of dental caries; 2) creation of technical capability; and 3) sustainability of programs. Fluoridation programs in the Region vary by type of system used (water or salt), coverage, and status. As of this writing, Argentina, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, the Dominican Republic, Ecuador, Jamaica, Mexico, Peru, the United States, Uruguay, and Venezuela have water or salt fluoridation systems, or both; Belize, El Salvador, Guatemala, Nicaragua, Panama, Paraguay have initiated the development of some type of system; and Grenada, Guyana, and Suriname have plans to import fluoridated salt. Only Argentina, Brazil, Canada, Chile, Panama, and the United States have national water fluoridation systems; coverage is 65% in São Paulo, Brazil, and 67% in the United States (255).

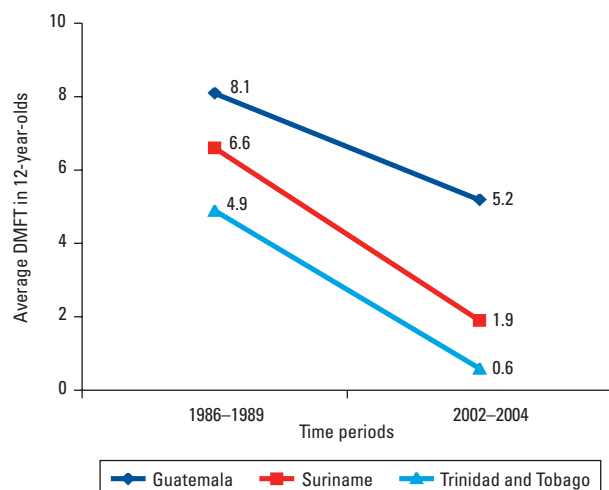
The most successful experiences with salt fluoridation have been in Costa Rica, Jamaica, and Mexico. The first two began fluoridation programs in 1987, and Mexico followed suit in 1991. Epidemiological data from the second half of the 1980s and the first half of the 1990s show annualized percentage reductions in dental caries in the permanent teeth of 12-year-old children of between 6.6% (Mexico) and 15.2% (Jamaica) (255). Similar trends are expected in other countries in the Region, including Ecuador, Peru, and Uruguay, which launched salt fluoridation programs in the mid-1990s. Other vehicles for administering fluoride have been used successfully in the Region, as demonstrated by the

TABLE 22. Decayed, missing, or filled teeth (DMFT) index and percentage reduction among 12-year-old children, selected countries, Region of the Americas, 1980–2004.

Country	Year/ period	DMFT	Year/ period	DMFT	Reduction (%)	Annualized reduction (%)
North America						
Canada	1982	3.2	1990	1.8	43.8	6.9
United States	1986–1987	1.8	1988–91	1.4	21.8	7.9
Mexico	1988	4.4	1997–98	3.1	29.6	3.5
	1987	4.6	2001	2.0	45.7	6.5
Central America and Panama						
Guatemala	1987	8.1	2002	5.2		
Belize	1989	6.0	1999	0.6	89.5	20.2
El Salvador	1989	5.1	2000	1.4	74.5	11.7
Honduras	1987	7.7	1997	4.0	48.4	6.4
Nicaragua	1983	6.9	1997	2.8	60.0 (1983–97)	6.3
	1988	5.9				
Costa Rica	1988	8.4	1992	4.9	42.2 (1988–92)	12.8
			1999	2.5	72.5 (1988–99)	10.6
Panama	1989	4.2	1997	3.6	13.3	1.8
Andean Area						
Venezuela	1987	3.7	1997	2.1	42.2	4.1
Colombia	1977					
	1980	4.8	1998	2.3	52.1	3.7
Ecuador	1988	5.0	1996	2.9	40.5	5.9
Peru	1988	4.8	1990	3.1	N/D	
Bolivia	1981	7.6	1995	4.6	39.3	3.5
Chile	1987	6.0	1992	4.7	47.8 (1987–99)	7.0
			1996	4.1		
			1996	3.4	12.8 (1992–96)	3.4
Southern Cone and South America's northeastern area						
Argentina	1987	3.4				
Uruguay	1983–1987	8.5	1992	4.2		
		6.0	1999	2.5	40.6 (1992–99)	7.2
Paraguay	1983	5.9	1999	3.8	35.1	2.7
Brazil	1986	6.6	1996	3.1	54.0 (1986–96)	7.5
Suriname			1992	2.7		
			2002	1.9		
Guyana	1983	2.7	1995	1.3	51.9	5.9
Caribbean						
Anguilla	1986	7.5	1991	2.5	66.7	19.7
Bahamas	1981	1.6	2000	1.3	2.5	0.1
Cayman Islands	1989–		1995	1.1		
	1990	4.6	1999	0.9	63.0	16.6
Jamaica	1984	6.7	1995	1.1	83.9	15.2
Dominican Republic	1986	6.0	1997	4.4	26.0	2.0
Saint Kitts and Nevis	1979–1980	5.5	1998	2.6	53.4	3.8

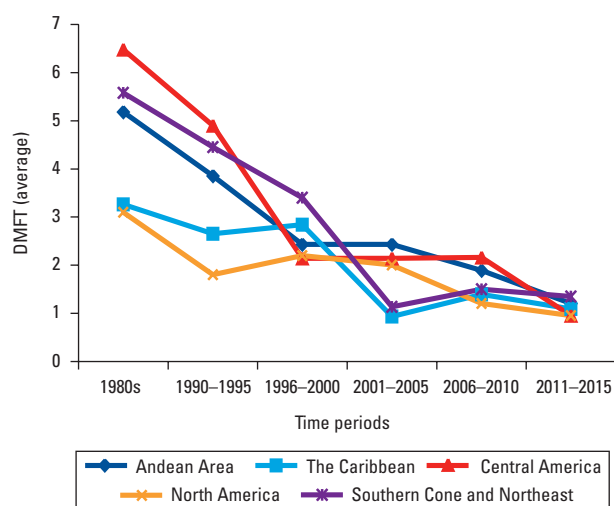
Source: Estupiñán-Day, S. Promoting Oral Health: The Use of Salt Fluoridation to Prevent Dental Caries, Pan American Health Organization, Scientific and Technical Publication No. 615, Washington, D.C., PAHO, 2005.

FIGURE 25. Reduction in the number of decayed, missing, or filled teeth (DMFT) in children 12 years old, Guatemala, Suriname, and Trinidad and Tobago, 1980s and 2002–2004.



Source: Estupiñán-Day, S. (2005). "Promoting Oral Health: The Use of Salt Fluoridation to Prevent Dental Caries." Pan American Health Organization, (PAHO/WHO), Washington, D.C. Scientific and Technical Publication No. 615, Reviewed by John J. Warren, DDS, MS. Journal of Public Health Dentistry, 2006.

FIGURE 26. Average number of decayed, missing, and filled teeth (DMFT) at age 12, by subregion, Region of the Americas, 1980–2015.



Source: Tellez, M. Progress Report No. 1 (Development Stage of Chapter Oral Health). Pan American Health Organization, July 2006.

fluoridation of milk in Codigua, Chile, between 1994 and 1999 (263). Roughly 400 million Latin American and Caribbean people are expected to have access to salt or water systemic fluoridation by 2010 (255).

Dental Fluorosis

Dental fluorosis is not considered to be a disease, as is dental caries, but rather a change in the mineralization of the dental enamel resulting from high exposure to fluoride during the formation and maturation of teeth. For all prevention programs in which systemic fluoride is administered to children under the age of 8, a 10% to 15% increase in the prevalence of the milder forms of fluorosis can be expected. Accordingly, it has been recommended that fluorosis be included in the Region's oral epidemiological surveillance programs.

Epidemiological studies conducted in the second half of the 1990s found that the prevalence of fluorosis ranged from 2.3% (Honduras) to 25.6% (Chile). A high prevalence of fluorosis is due not only to the consumption of fluoridated water or salt, but also to the use of fluoridated toothpaste; prevention programs that deliver fluoride supplements, as is the case in the Bahamas (where the prevalence rate of fluorosis is 24%); and high concentrations of fluoride occurring naturally in the water (greater than 1.5 mg/L) in Belize, Bolivia, Costa Rica, the Dominican Republic, and Paraguay. More recent cross-sectional studies in Colombia (264), the United States (265), and Mexico (266, 267), have found an increase in the prevalence of dental fluorosis, particularly among schoolchildren and young adults.

A literature review found that the prevalence of fluorosis (mild to severe) in Mexico ranges from 30% to 100% in areas with natural fluoride in the water, and from 52% to 82% in areas where fluoridated salt is used (266, 267). In Colombia, 1,061 children in primary school in the central region of Caldas were examined, and 63% were found to have some degree of fluorosis (56% had mild or very mild fluorosis, 7% had moderate or severe fluorosis) (264).

Practice of Atraumatic Restoration

In Latin America, the traditional restorative treatment for dental caries is the amalgam treatment, which is expensive and not very accessible, particularly among low-income groups. Atraumatic restorative treatment (ART), widely used elsewhere in the world (268–270), is a successful treatment that holds much promise in the Region. The technique involves removing carious tooth tissue with manual instruments only and filling the prepared cavity with an adhesive material, such as glass-ionomer, which supports the minimum intervention restorative concept (271). The purpose of the technique is to remove external, demineralized dental tissue; the technique does not require anesthesia, significantly reducing pain and fear in patients (268, 269). However, the lack of information on the cost-effectiveness of this technique, compared with conventional amalgam treatments, and its success when nontraditional personnel (dental assistants) perform the restorations prompted WHO and the IDB to conduct a prospective clinical study (272).

The study, which was carried out in Ecuador, Panama, and Uruguay, considered the countries' geographical, epidemiologi-

TABLE 23. Changes in the stages of the oral health typology,^a Region of the Americas, circa 1996 and 2005.

	1996			2005		
	Emerging	Growth	Consolidation	Emerging	Growth	Consolidation
Anguilla						✓
Argentina		✓			✓	
Aruba						✓
Bahamas			✓			✓
Barbados						✓
Belize	✓					✓
Bermuda			✓			✓
Bolivia		✓			✓	
Brazil		✓				✓
Canada			✓			✓
Cayman Islands						✓
Chile		✓			✓	
Colombia		✓				✓
Costa Rica		✓				✓
Cuba			✓			✓
Curaçao						✓
Dominica			✓			✓
Dominican Republic	✓				✓	
Ecuador		✓				✓
El Salvador	✓					✓
Granada						✓
Guatemala	✓			✓		
Guyana			✓			✓
Haiti	✓					✓
Honduras	✓				✓	
Jamaica			✓			✓
Mexico		✓				✓
Nicaragua	✓					✓
Panama		✓			✓	
Paraguay	✓				✓	
Peru	✓					✓
Puerto Rico		✓				
Saint Lucia				✓		
Suriname		✓				
Trinidad and Tobago		✓				✓
Turks and Caicos						✓
United States			✓			✓
Uruguay		✓				✓
Venezuela		✓				✓

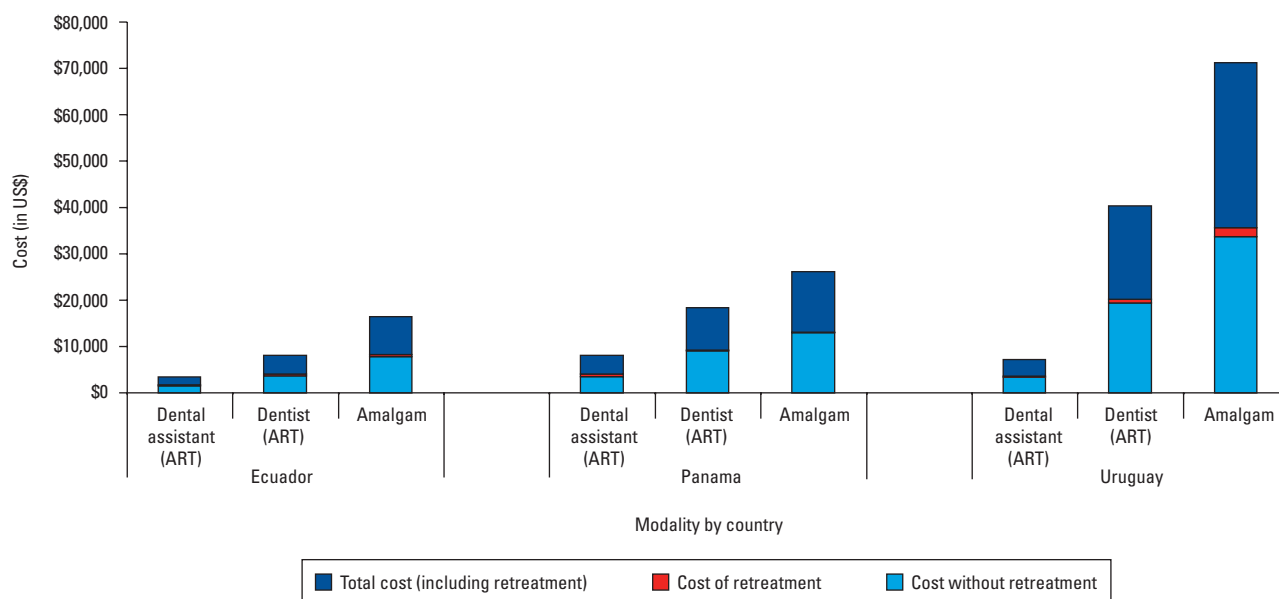
^aEmerging stage, DMFT >5; growth stage, DMFT 3–5; consolidation stage, <3.

Source: Estupiñán-Day, S. *Promoting Oral Health: The Use of Salt Fluoridation to Prevent Dental Caries*, Pan American Health Organization, Scientific and Technical Publication # 615, Washington, D.C., PAHO, 2005.

cal, and economic differences. Approximately 1,630 children between the ages of 6 and 9 years who presented carious lesions in the enamel or tissue, or both, of their first permanent molars participated in the study. The children were randomly assigned to a treatment group (ART or amalgam) and reexamined 12 and 24 months later (and scheduled for reexamination at 36 months) to evaluate the restorations (in accordance with criteria set for ART restorations and by the United States Public Health Service) and

identify new lesions. In order to compare possible differences between restoration failure rates and service provider costs, both dentists and dental assistants were enlisted to perform the ART technique. During each procedure, information was recorded on the materials used and the time required for application; an estimate of the cost-effectiveness also was noted (272).

The study's preliminary findings clearly show the superiority of the ART technique over the amalgam treatment in terms of

FIGURE 27. Cost-effectiveness^a of atraumatic restorative treatment (ART) and of amalgam treatment, by service provider, Ecuador, Panama, and Uruguay, 2006.

^aAt one year considering mainly planned treatments (figures in US\$)

Note: Total costs including retreatment were calculated based on the following number of failed restorations in a one-year period: Ecuador—dental assistant/ART, 159; dentist/ART, 105; dentist/amalgam, 57. Panama—dental assistant/ART, 157; dentist/ART, 19; dentist/amalgam, 9. Uruguay—dental assistant/ART, 58; dentist/ART, 40; dentist/Amalgam, 58.

Source: Estupiñán-Day S., Milner T., Tellez M. (2006). "Oral Health of Low Income Children: Procedures for Atraumatic Restorative Treatment (PRAT). Final Report. Pan American Health Organization and Inter-American Development Bank. Washington, D.C. ATN/JF-7025-RG-Project No. 091024.

cost-effectiveness. Despite the fact that restorations were more likely to fail in Ecuador and Panama when dental assistants, as opposed to dentists, performed the ART technique, the cost savings could be significant. Taking into consideration the equipment and materials, personnel per procedure, and replacements of failed restorations, the annual total cost associated with the treatment and replacement of restorations by dental assistants is half the cost of ART procedures performed by dentists, and less than one-third of the cost of amalgam procedures performed by dentists (Figure 27) (272). Relying on the ART technique as a new model for the large-scale delivery of oral health services integrated into primary health care systems, and one in which professionals with different levels of academic training (dentists, dental assistants) participate, could reduce disparities in access to health services (272).

Periodontal Disease and Its Association with Systemic Disease

Periodontal disease is one of two major oral conditions that affect the world's population with high prevalence rates and severity (273). At this writing, the most valid clinical indicators of the disease are loss of clinical attachment and loss of bone mass. However, very few representative studies in the Region have used these indicators (274). The most commonly used indicator is the community periodontal index (CPI), recommended by WHO to

generate population profiles of periodontal disease in the Region's countries and to carry out comparisons internationally (254). Although it is a practical indicator for epidemiological studies, its validity has been questioned on several occasions on grounds that it is insufficiently sensitive to evaluate the extent and severity of the disease (274).

Gingivitis is widespread in the Region, although it is more prevalent among low-income groups and affects men at higher rates than women (274). The overall prevalence of severe periodontal disease ranges between 4% and 19% (274). These variations in the Region are due, in part, more to methodological differences than geographical variations. The risk factors for periodontal disease are consistent with nontransmissible disorders or conditions, such as tobacco use, malnutrition, excessive alcohol consumption, stress, diabetes mellitus, and other systemic disorders (273). A focus on behavioral and environmental risk factors is critically important for the development of effective disease prevention strategies.

Dental caries harbor opportunistic microorganisms and infections that can affect other organs of the body. A number of risk factors for systemic diseases are correlated with oral diseases, and these have been associated with cardiovascular disease, diabetes, and infarctions (275). Infections that affect pregnant women can cause changes in the hormonal system that regulates gestation, which can lead to preterm birth, early rupture of membranes, and low birthweight (276, 277). Controlled

clinical studies in the Region have documented the association between periodontal disease and preterm birth or low birth-weight. Periodontal disease may have similar pathogenic mechanisms to other maternal infections, as documented in controlled clinical studies of the Chilean population (278, 279).

OCULAR HEALTH

Blindness and Loss of Vision

The International Classification of Diseases, 10th Revision, categorizes visual impairment as a visual acuity under 20/70 (6/18), and blindness as a visual acuity under 20/400 (3/60) in the best eye. The burden of visual impairment is not distributed uniformly; in many Latin American and Caribbean countries it is estimated that for every million persons, 5,000 are blind and 20,000 are visually impaired. At least two-thirds are attributable to treatable conditions such as cataracts, refractive errors, diabetic retinopathy, and glaucoma (Figure 28). About 85% of blindness occurs in adults 50 years old and older (280–282).

Between 1999 and 2005, PAHO and the Christoffel-Blindenmission (CBM) promoted and supported the conduct of national-level rapid assessments of avoidable blindness and cataract surgical services in Cuba, Paraguay, and Venezuela. Similar urban studies were done in Buenos Aires, Argentina; Guadalajara, Mexico; and Campinas, Brazil. Rural rapid assessments were developed in Piura and Tumbes in Peru, and in Chimaltenango, Guatemala (283).

According to national surveys, the prevalence of blindness in people 50 years old and older varied from 2.3% to 3% (283); the prevalence in urban areas of Campinas, Brazil, and Buenos Aires, Argentina is 1.4% (284), and in rural areas of Guatemala and Peru, the prevalence nears 4% (285).

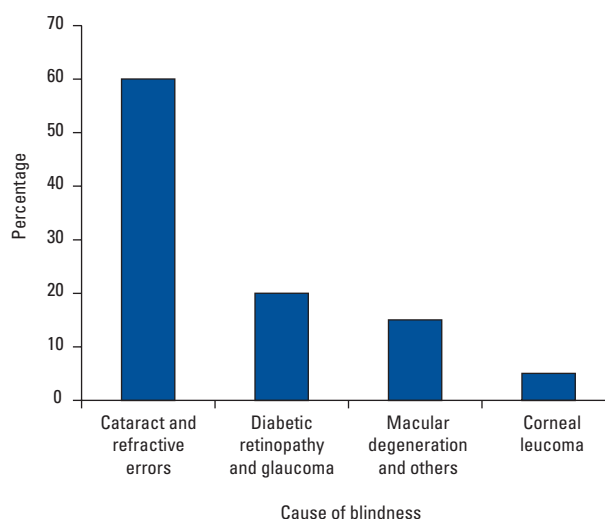
The proportion of blindness due to cataract in people aged 50 years old and older varied from 39% in the urban areas of Brazil and Argentina (284) to about 65% in the rural areas of Guatemala and Peru (285). National assessments revealed that close to 60% of blindness is due to cataracts (283). In Latin America, eye care services coverage for visual acuities under 20/200 is close to 80% in well developed, urban areas and under 10% in rural and remote areas (283).

The quality of surgery is highly variable. In rural areas, up to 30% of eyes operated with intraocular lenses may have a visual acuity under 20/200, compared to about 8% of eyes operated with intraocular lenses in urban, well-developed areas (283).

The Barbados eye studies found a prevalence of 42% with lens opacities, 7% with open angle glaucoma, and less than 1% with age-related macular degeneration among 40–84-year-olds (286). Prevalence of open-angle glaucoma varied among different ethnic groups, from 0.8% in whites, to 3.3% in mixed-race persons and 7% in blacks (286).

Diabetic retinopathy in Latin America is one of the main causes of blindness, after cataracts and glaucoma (282). A dia-

FIGURE 28. Causes of blindness, Latin America and the Caribbean, 2007.



Source: PAHO/WHO estimates.

betes and blindness survey in the Dominican Republic found that 5% of blindness was due to diabetic retinopathy (287). The Barbados eye studies found that among people of African origin, 1 in 17 had diabetic retinopathy; among diabetics, 29% had retinopathy (288).

Uncorrected refractive errors is the most common cause of bilateral visual impairment across all decades of life (289). In the Caribbean population 40–84 years old, myopia occurs in 22% and hyperopia in 47% (290). A study conducted in Santiago, Chile, among 6,998 schoolchildren found that more than 7% could benefit from proper spectacles, but 70% of that group had not had their vision corrected at the time of the eye exam (291).

In Latin America, onchocercosis is regionally clustered in 13 foci in Brazil, Colombia, Ecuador, Guatemala, Mexico, and Venezuela. The disease affects about one-half million persons, but it is not a major cause of blindness or visual impairment; currently, the Onchocerciasis Elimination Program for the Americas (OEPA) provides technical and financial support. Treatment with Mectizan® is given twice a year in endemic communities; 12 out of 13 foci are close to reaching the expected 85% coverage (292).

Vitamin A deficiency in Latin America and the Caribbean is usually subclinical. In the 1980s, it was reported as a public health problem in Bolivia, Haiti, Honduras, and Nicaragua (293, 294). Interventions to eliminate vitamin A deficiency are linked to nutrition, immunization, and primary health care systems.

Trachoma is caused by *Chlamydia trachomatis* infection and it is not a major cause of blindness in Latin America. Some foci have been identified in Brazil, Guatemala, and Mexico (295). Brazil has a trachoma control program at the federal level that is conducting a national trachoma school survey in 11 states. A prevalence of active disease was found in 5.2% children 1–9 years old. The program provides antibiotic treatment, and there is no data on trichi-

asis surgery (296). In Guatemala, trachoma is present in 92 communities; an NGO screens people 1–40 years old and provides antibiotics and trichiasis treatment. The State of Chiapas in Mexico put in place the Trachoma Prevention and Control Program implementing the surgery, antibiotics, facial hygiene, and environmental change (SAFE) strategy (296). The program is close to eliminating the disease in the state (no other state in Mexico reported active cases of trachoma).

The estimated prevalence of childhood blindness in Latin America is 4 to 6 per 10,000 children (297); between 34% and 44% of cases of childhood blindness are preventable or treatable. The most common preventable causes are rubella, toxoplasmosis, and ophthalmia neonatorum, while the most common treatable diseases are congenital cataracts, congenital glaucoma, and retinopathy of prematurity (ROP) (297). Various studies revealed that ROP is the most common etiology in the Region, especially in countries that have introduced neonatal intensive care services for low birthweight infants (297, 298).

Cost of Blindness

The annual gross domestic product (GDP) loss from blindness is being calculated by direct and indirect costs related to visual impairment, including direct medical costs; loss of earnings; cost to caregivers, including their loss of earnings; aids; equipment; home modifications; and suffering. In 2000, the annual GDP loss from blindness and low vision in Latin America and the Caribbean was calculated at US\$ 3.2 billion. Prevention of blindness programs generate enormous savings for national economies. For 2020, the annual GDP loss in Latin America and the Caribbean from blindness and low vision has been estimated at US\$ 10 billion, compared to US\$ 3.7 billion if prevention of blindness programs were implemented in every country of the Region (299, 300).

Successes in Disease Control

In Latin America and the Caribbean, the annual cataract surgical rate per 1,000,000 varies according to a country's social and economic development. The rate has been increasing over time in most countries: in 1999, just 17% of countries had annual cataract surgical rates above 1,500 (301); in 2006, about half of the countries had such a rate. In 1995, just 25% of countries had a specialized low-vision service providing visual aids to persons who could not improve their vision by regular eyeglasses or medical or surgical treatment. At this writing, most countries have at least one such specialized service. In 2000, just a few countries had a retinopathy of prematurity (ROP) program (302); currently, 18 countries have ROP programs at different stages of development. Several programs for refractive defects in school-children have been organized, along with the sustainable production of low-cost spectacles. Successful communication

programs to detect glaucoma in high-risk groups have been implemented and evaluated in the Caribbean (303); the production of low-cost eyedrops improved accessibility of glaucoma medications in the same subregion.

Several pilot programs on diabetic retinopathy have been initiated to create models of screening and treatment, assessing feasibility and cost-effectiveness. During 2006 and 2007 OEPA is conducting ophthalmologic evaluations in the different foci to assess the elimination of ocular morbidity related to that disease.

Partnerships

The Pan American Health Organization has had long-standing partnerships with Sight Savers, the Caribbean Council for the Blind, the Christoffel Blindenmissie (CBM), the Fundación Once para América Latina (FOAL), and others. Vision 2020: The Right to Sight was launched in 1999 by the World Health Organization and the International Agency for the Prevention of Blindness to provide technical and resource support to Member Countries. Other organizations (Lions Club International, Rotary International) and countries (Venezuela and Cuba, through *Operación Milagro* [Operation Miracle]) also are providing technical and financial support to Latin American and Caribbean countries to help them reduce avoidable blindness.

The Future

Efforts should continue to increase coverage of cataract surgery in order to control the leading cause of blindness. Implementation should give priority to underserved groups (ethnic, gender, minorities, rural residents, and the poor). It also is necessary to expand programs to address low vision, childhood blindness, and refractive defects; develop model programs for diabetic retinopathy; and promote research in glaucoma detection and treatment.

SEXUAL AND REPRODUCTIVE HEALTH

In spite of advances made in the years after the International Conference on Population and Development in Cairo in 1994 (304) and the Fourth World Conference on Women in Beijing in 1995 (305), the impact of actions to improve sexual and reproductive health (SRH) has been very weak, inasmuch as it has not yet been determined how to narrow the inequity gap or provide support to countries, their leaders, and the community in correcting the disparities in access to information and services that will lead to a more equitable distribution of health-care goods. In considering sexual and reproductive health, the International Conference issued pronouncements on several key issues (304). First, everyone has the right to the enjoyment of physical, mental, and social well-being, not merely to the absence of disease or infirmity in all matters relating to the reproductive system and to

its functions and processes. Reproductive health, therefore, implies that people are able to have a satisfying and safe sex life and have the capability to reproduce as well as the freedom to decide if, when, and how often to do so. Implicit in this last condition is the right of men and women to be informed and to have access to safe, effective, affordable, and acceptable methods of family planning of their choice; the right to access appropriate health-care services that will ensure safe pregnancy and childbirth; the right to medical care for sexually transmitted infections, including HIV/ AIDS; and the prevention of cancer of the female reproductive system, menopause-related disabilities, and sexual violence.

Although advances are being made in defining policies and programs, which in turn have brought about improvements in aspects of sexual and reproductive health in the Region, a Regional strategy has yet to be developed.

Action must be focused at political, social, and administrative levels, where effective strategic plans should be formulated, the capacity to define priorities in the field of sexual and reproductive health developed, legal and political constraints eliminated, political will mobilized, and the visibility of the problem and accountability of the various actors enhanced. Activities also must focus on sexual and reproductive health promotion and services, in which utilization of human resources must be improved; the adoption of good practices at the national and regional levels must be fostered; and the barriers preventing or limiting the use of services by individuals, families, and the community must be eliminated.

Status of Sexual and Reproductive Health in the Region's Countries

The total estimated population of the Region in 2005 was 892 million, with 561 million (63%) living in Latin America and the Caribbean. Each year, slightly more than 16.2 million children are born in the Region, 11.7 million of them in Latin America. Although the population continues to increase (306), birth and fertility rates are clearly declining, which in conjunction with falling mortality rates has meant that 10 countries in the Region have completed or have nearly completed their demographic transition. For example, the overall estimated fertility rate in Cuba is 1.6 children per woman. At the other extreme is Guatemala, however, with a fertility rate of 4.3 children per woman.

This decline in the birth rate, along with changes in mortality, translates into a slowing of the natural growth rate of the Region, but also into major growth of the population of adolescents and young people owing to demographic inertia, as well as to a clear trend towards the aging of the population in most countries. This situation, combined with the increase in the absolute number of poor people in Latin America and the Caribbean (currently estimated at more than 150 million persons), the feminization of poverty, and a sharp increase in unemployment in most countries, translates into a widening of inequity gaps for large popula-

tion groups, an increase in poverty transmitted from generation to generation, and an ever-increasing shift of major population groups to urban peripheries and to nearby or distant countries. The conditions described impose additional burdens on health-care systems in general and adversely affect sexual and reproductive health in particular.

Sexual and reproductive health accounts for approximately 20% of the total illness burden among women and 14% among men, revealing a clear-cut gender gap. Individual countries and the Region as a whole have advanced in some aspects of sexual and reproductive health, but there is a very marked contrast between the health indicators of the Region's most developed countries (Canada and United States) and those of Latin American and Caribbean countries. This disparity can be partly explained by the sharp economic adjustment these countries have undergone, which has widened existing inequity gaps between countries and within countries.

Contraceptive use in the Region exceeds 60%, although Bolivia, the Dominican Republic, Guatemala, Haiti, Honduras, Mexico, Paraguay, and Venezuela still see limited progress (306). Emergency contraception and condom use for preventing sexually transmitted infections and unwanted pregnancies are barely practiced by users or in the health care services in the Region.

Women's Health and Maternal Health

Maternal health can be regarded as a summary gauge of reproductive health and can be used as an indicator, for lack of a more accurate one, of the status of maternal health. Estimates published in the annual yearbook of health statistics (307) show 22,680 maternal deaths (circa 2003) and 16.2 million births (same year) in the Region; accordingly, the maternal mortality rate is around 140 per 100,000 live births. Yet PAHO basic indicators informed by reports from the countries' ministries of health for the same year show a maternal mortality rate of 71.9 per 100,000 live births (11,652 deaths due to maternity-related causes).

If the risk of maternal death in Latin America and the Caribbean is compared with the risk in Canada, the average in the former is 21 times greater than that in the latter. Moreover, when national averages of maternal death rates are examined, a broad range is seen, ranging from 523 per 100,000 live births in Haiti to 13.4 in Chile (306). Another way to analyze these differences is by the time lag of the indicator, which can be measured by comparing the current rate in one country with a time series in another. For example, if the current rate of maternal mortality in Haiti is compared with a time series of the same rate in the United States, the former corresponds to the 1930 rate in the United States; in other words, a lag of more than 75 years. If the current rate in Haiti is compared with the time series for Chile, the former corresponds to the 1980 rate in the latter, or a lag time of more than 25 years.

TABLE 24. Leading causes of maternal mortality, by mortality rate and availability of reproductive services, groups of countries, Region of the Americas, 2004.

Service coverage	Maternal mortality rate per 100,000 live births			
	<20	20–49	50–100	>100
Contraception, 70%–75%	Group A countries			
Prenatal care, 100%				
Delivery, 100%				
	1. Indirect 2. Preeclampsia 3. Infections			
Contraception, 45%–69%	Group B countries			
Prenatal care, 90%–100%				
Delivery 90%–100%				
	1. Abortion 2. Preeclampsia 3. Hemorrhage			
Contraception, 45%–66%	Group C countries			
Prenatal care, 45%–96%				
Delivery 83%–97%				
	1. Preeclampsia-eclampsia 2. Hemorrhage 3. Abortion			
Contraception 28%–58%	Group D countries			
Prenatal 53%–86%				
Delivery 24%–86%				
	1. Hemorrhage 2. Preeclampsia-eclampsia 3. Obstructed delivery			

Note: Group A countries: Canada, United States, Puerto Rico; Group B countries: Argentina, Brazil, Chile, Costa Rica, Cuba, Mexico, and Uruguay; Group C countries: Colombia, Ecuador, Panama, Nicaragua, and Venezuela; Group D countries: Bolivia, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Paraguay, and Peru.

Source: Based on Schwarcz R, Fescina R. Maternal Mortality in Latin America and the Caribbean. *Lancet* 2000; 356 (suppl.) S11:3245–67. (Figures updated to 2004).

An analysis of the indicators in several countries of the Americas (accounting for approximately 98% of the total population), in terms of their maternal mortality rates (less than 20, 20–49, 50–100, and over 100 per 100,000 live births), their prenatal and delivery care coverages, and the prevalence of contraception use (Table 24), shows that the basic causes of death are almost the same in the four groups, although their rank order differs (308).

This type of analysis enables more specific interventions to be proposed. For example, a recommendation for group A would be to strengthen care in pre-pregnancy for the most vulnerable populations; for group B, the recommendation would be to intensify sex education and family planning programs, including emergency contraception; for group C, prenatal monitoring coverage should be broadened; and for group D, access to care should be guaranteed through the elimination of economic and cultural barriers, the establishment of birthing homes near health-care services, and improvements to services.

Prenatal care coverage of at least one office visit averaged higher than 85%. However, an analysis by income quintile shows that in Bolivia, Brazil, Colombia, Guatemala, Haiti, Nicaragua, Paraguay, and Peru, 90% or more of pregnant women in the highest-income quintile had prenatal check-ups, compared to just 35%–68% in the lowest-income quintile (309). It bears noting that this level of coverage is not a measure of the real prenatal care situation. Prenatal care should consist of at least four or five duly scheduled office visits, with early enrollment and a well-defined procedure. If these standards were applied, actual coverage figures would be much lower.

In terms of delivery care by trained personnel, an increase of 11% between 1999 and 2002 was observed; as a result this indicator averages above 88% in Latin America (309). Nonetheless, there are still nine countries with below-average figures, with coverage ranging from 24% (Haiti) to 84% (Guatemala). An analysis of qualified delivery care by income quintiles shows that it exceeds 90% among the wealthiest in countries such as Brazil, Bolivia, Colombia, Guatemala, Haiti, Nicaragua, Paraguay, Peru, and the Dominican Republic. Yet among lower-income quintiles it stands at just 20% in Bolivia, Guatemala, Haiti, and Peru; between 30% and 40% in Nicaragua and Paraguay; and between 60% and 85% in Brazil, Colombia, and the Dominican Republic (309).

The incidence of cesarean section is an indicator of the quality of perinatal care. A WHO recent study in different regions found an overall cesarean section rate of 35% in Latin America. Data from the 2006 World Yearbook of Health Statistics (307) show wide variations between countries, from 2% in Haiti and 8% in Belize, to 36% in Brazil and 37% in Chile. WHO has indicated that the optimal rate of cesarean section is between 15% and 20%.

The prevalence of modern contraceptive use in Latin America and the Caribbean averaged 65%, with a range from 28% in Haiti to 84% in Uruguay.

A serious public health problem is unsafe abortion, one of the three leading causes of maternal deaths in all countries (except Canada and the United States). Estimates are that more than four million abortions are performed every year in Latin America, 2.2 million of them in three countries (Brazil, 1.2 million; Argentina, 500,000; and Mexico, 500,000) (310). In addition, one-quarter of

maternal deaths in Chile were the result of an abortion, and in Argentina, Jamaica, and Trinidad and Tobago the proportion exceeds 30%.

The rate of HIV infection among pregnant women and newborns has increased in recent years. The rate of HIV seroprevalence among pregnant women, which is an approximate measure of the extent of infection among the population at large, is as high as 13% in Haiti as a whole, 10% among urban adults, and 4% in rural areas (311). In several regions of the Dominican Republic, 1 of every 12 women receiving prenatal care was infected, with rates of 7.1% in Guyana, 3.6% in the Bahamas, 2.5% in Belize, 1.5% in Jamaica, and 1.4% in Honduras (311).

Perinatal Health

Several indicators provide a comprehensive assessment of perinatal health, including fetal, neonatal, and perinatal mortality rates. However, due in part to significant underreporting and because countries continue to use different cutoff points for these indicators, the magnitude of fetal and perinatal mortality is not well known Regionwide. Despite reporting-related difficulties, in 2006 WHO estimated a total of 280,000 perinatal deaths (a rate of 17.3 per 1,000) in the Americas, around 45% of which were late stillbirths and 55% (152,000) early neonatal deaths (312). The risk of perinatal death in Latin America and the Caribbean is, on average, three times higher than that in Canada and the United States (312).

Moreover, 85% of all neonatal deaths are associated with low birthweight (<2500 g); the most common causes are preterm births and fetal growth retardation. In the Region, the proportion of low-birthweight children ranges from 5.7% in Canada to 12% in Guatemala. The neonatal component accounts for the highest proportion of infant mortality (61%) in Latin America and the Caribbean. The infant mortality rate in Latin America and the Caribbean circa 2003 averaged 24.8 per 1,000 live births, or an approximate 290,000 infant deaths, 177,000 of them associated with the perinatal period (306).

Sexual and Reproductive Health of Adolescents

Every year there are some 54,000 births to mothers under age 15 and two million to mothers between 15–19 years old. The specific birthrate among mothers 15–19 years old ranges from 23.4 per 1,000 live births in Chile to 136 per 1,000 in Honduras. Among 10–14-year-olds, the rate ranges from approximately 1% in Uruguay and Cuba to 4% in Brazil and Haiti (302, 313). In the latter age group the rate of maternal mortality doubles that of the 15–19-year-olds (Table 25).

Adolescents tend to be sexually active at early ages in the Region, where the average age at which both sexes start having sexual relations is 16; the lower end is 14 in the Caribbean and the higher end, 17 in Paraguay. In the United States, 77% of adolescent girls have had their first sexual relationship, but only 17%

TABLE 25. Maternal mortality rate (per 100,000 live births) by age of adolescents, selected countries, Region of the Americas, circa 2003.

Country	10–14 years old	15–19 years old
Mexico	131	37
Argentina	190	23
Chile	42	20
Brazil	65	38

Source: Statistics from the countries:

Mexico: Secretaría de Salud. <http://www.salud.gob.mx/>.

Argentina: Instituto Nacional de Estadísticas y Censos <http://www.indec.mecon.gov.ar/>.

Chile: Instituto Nacional de Estadística http://www.inec.cl/inec/canales/chile_estadistico/home.php.

Brazil: Ministério da Saúde. Datasus <http://w3.datasus.gov.br/datasus/datasus.php>. (Accessed 6 November 2006).

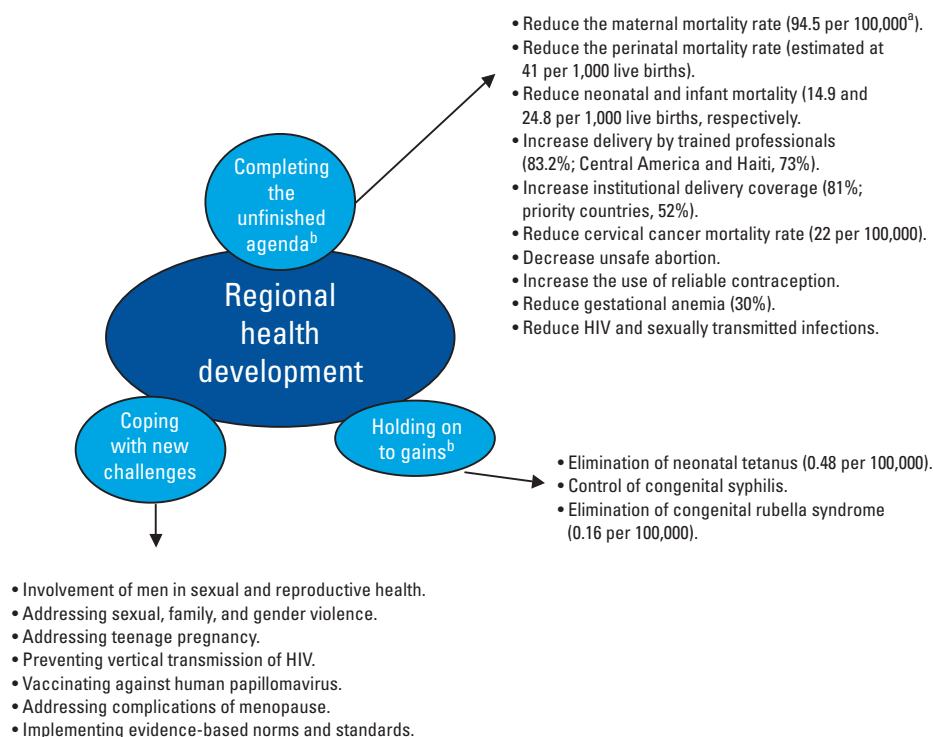
become pregnant; in contrast, in Latin America and the Caribbean, only 56% have started having sex, but 34% have had a child before age 19. This situation could be explained by the difference in education, especially with regard to sexual and reproductive health, and differences in access to contraception between the two subregions (304). Besides the repercussions of pregnancy for adolescent mothers themselves, neonatal and infant mortality is twice as high among mothers in that age group than among 20–24-year-olds. Fetal mortality is not substantially different.

Sexual and reproductive health in the Region requires safeguarding advances already made and addressing unresolved issues (unfinished business) and any new challenges. The framework for technical cooperation to cope with the future is presented in Figure 29.

PREVENTING RISKS

FOOD AND NUTRITION FOR A HEALTHIER LIFE

In the Region, 12.5 million disability-adjusted life years (DALYs) are lost to nutrition-related noncommunicable chronic diseases such as hypertension, cardiovascular disease, and type 2 diabetes; in addition, 4.6 million are lost because of malnutrition in mothers and young children (314). As does malnutrition in children, the burden of noncommunicable diseases disproportionately affects the poor in both relative and absolute terms. Yet, whereas child malnutrition affects some countries in the Region more than others, depending on a given country's level of poverty and relative equity in income distribution, chronic noncommunicable diseases are a problem in all the countries. Micronutrient deficiencies also are widespread. Some, such as iodine deficiency and vitamin A deficiency, overlap considerably with child malnutrition. Others, such as iron, zinc, and folate deficiencies, are highly prevalent in infants and young children and in women of reproductive age in all income groups.

FIGURE 29. Conceptual framework for technical cooperation in sexual and reproductive health.

^aEstimated rate: 190 per 100,000 (UNICEF/UNFPA/WHO, 2002) and 140 per 100,000 (World Health Statistics, 2006).

^bThe latest available figures are given in parentheses.

The quality of the food consumed is a greater problem than the amount of food consumed. Poor dietary quality, coupled with diarrhea and acute respiratory infections in infants and young children, causes growth failure early in life. Micronutrient deficiencies throughout the life cycle, coupled with sedentary lifestyles, are causing an epidemic of chronic noncommunicable diseases in adults. These factors translate into overweight and obese parents sharing the household with stunted and anemic children in both rural and urban areas.

Growth Patterns of Infants and Young Children

Linear growth retardation (stunting) is the most prevalent form of growth failure worldwide. Linear growth faltering begins at birth and continues through the first two years of life (315). Failure to adequately gain weight also begins at birth, but is less pronounced compared to height, and continues for a shorter period of time. Once growth faltering in height and weight ceases, children begin to gain weight and height at about the reference standard. Height deficits are permanent, however. As a result of the greater loss of linear growth compared to weight gain, most

children tend to have weight-for-height ratios that are above the median of the reference standard, indicating a tendency toward overweight. This tendency puts such children at later risk of chronic diseases. The age-specific risk patterns for stunting are similar in all the Region's countries, despite widely varying levels of stunting. This confirms that the first two years of life represent a critical window of opportunity for improving nutrition.

The prevalence of stunting in the Americas is about three to four times greater than that of underweight. The fact that children are much more likely to gain weight adequately, as compared to growing in length adequately, illustrates that dietary quality is a much greater problem than energy sufficiency. Micronutrient deficiencies, particularly iron, zinc, and calcium deficiencies, are known to be widespread in the complementary feeding diets of young children (316). High prevalence of diarrhea early in life also causes linear growth retardation.

The prevalence of growth retardation is declining in countries for which trend data are available (Table 26); nonetheless, more than one in four children are stunted in Bolivia, Ecuador, Honduras, and Peru, and one in every two is stunted in Guatemala. It should be noted that national-level data mask increasingly wide

TABLE 26. National prevalence of low height-for-age, weight-for-age, and weight-for-height, selected countries, Region of the Americas.

Country	Year	Height-for-age ^a (%)	Weight-for-age ^a (%)	Weight-for-height ^a (%)	Source of Information
Argentina	1996	13.0	5.4	2.9	MOH, 1999
Bolivia	1989	38.3	13.3	1.6	DHS, 1989
	1993–1994	28.3	15.7	4.4	DHS, 1994
	1998	26.8	9.4	1.8	DHS, 1998
	2003	26.5	8.0	1.3	DHS, 2003
Brazil	1986	27.7	13.2	1.0	DHS, 1986
	1996	10.5	5.7	2.3	DHS, 1997
Chile	2003	NA	0.9	0.4	MOH, 2003
Colombia	1986	22.7	11.9	1.0	DHS, 1986
	1995	15.0	8.4	1.4	DHS, 1995
	2000	13.5	6.7	0.8	DHS, 2000
	2005	12.0	7.0	1.3	DHS, 2005
Costa Rica	1996	6.1	5.1	2.3	Encuesta Nacional de Nutrición, MOH
Dominican Republic	1991	19.4	10.4	1.1	DHS, 1991
	1996	10.7	5.9	1.2	DHS, 1996
	2002	8.9	5.3	1.8	DHS, 2002
Ecuador	1986	34.0	16.5	1.7	Freire et al., 1988
	1998	26.4	14.3	2.4	LSMS, 1998
El Salvador	1993	22.8	11.2	1.3	CDC, 1994
	1998	23.3	11.1	1.1	CDC, 1998
	2002–2003	18.9	10.3	1.4	CDC, 2004
Guatemala	1987	69.7 (12–23 months)	41.5 (12–23 months)	21.8 (12–23 months)	DHS, 1996
	1995	68.7 (24–35 months)	41.5 (24–35 months)	10.0 (24–35 months)	DHS, 1996
	1998–1999	49.7	26.6	3.3	DHS, 1995
	2002	46.4	24.2	2.5	DHS, 2003
		49.3	22.7	1.6	
Honduras	1987	43.8	24.1	1.9	CDC, 1987
	1991	42.4	21.4	1.8	CDC, 1991
	1996	37.8	24.3	1.4	CDC, 1996
	2001	29.2	16.6	1.0	CDC, 2002
Haiti	1978	39.6	37.4	8.9	DHS, 1995
	1990	33.9	26.8	4.7	DHS, 1994/1995
	1994–1995	31.9	27.5	7.8	DHS, 1994/1995
	2000	22.7	17.3	4.5	DHS, 2000
Mexico	1988	22.8	14.2	6.0	Sepúlveda, 2000
	1999	17.7	7.5	2.0	Rivera et al., 2001
Nicaragua	1998	24.9	12.2	2.2	DHS, 1999
	2001	20.0	9.6	2.0	DHS, 2002
Paraguay	1990	16.6	3.7	0.1	DHS, 1990
	1995–1996	NA	NA	NA	CDC, 1995/1996
	1998	NA	NA	NA	CDC, 1999
Peru	1991–1992	36.5	10.8	1.4	DHS, 1991/1992
	1996	25.8	7.8	1.1	DHS, 1996
	2000	25.4	7.1	0.9	DHS, 2000
Uruguay	2002	10.6	4.9	1.8	MOH, 2002

Notes:^a < –2 standard deviations from the growth reference point set by WHO and the United States National Center for Health Statistics.

NA = not available.

Argentina: Encuesta Antropométrica en menores de 6 años bajo Programa Materno Infantil, Ministry of Health, 1999. Note that this is the only data included in the table that is not representative nationally. Rather it is representative of the Province of Buenos Aires, which has one-third to one-half of the total population.

Chile: Ministerio de Salud, 2003.

Costa Rica: Ministerio de Salud, 1996.

Ecuador: Freire W, Dirren H, Mora JO, Arenales P, Granda E, Breih J, Campaña A, Páez R, Darquea L, Molina E. Diagnóstico de la situación alimentaria, nutricional y de salud de la población Ecuatoriana menor de cinco años (DANS). Quito: CONADE, Ministerio de Salud Pública, 1988; Life Standards Measurement Survey, World Bank, 1998.

Mexico: Sepúlveda-Amor J, Lezana MA, Tapia-Conyer R, Valdespino JL, Madrigal H, Kumate J. Estado nutricional de preescolares y mujeres en México: resultados de una encuesta probabilística nacional. Gac Med Mex 1990;126:207–244; Rivera Dommarco J, Shamah Levy T, Villapando Hernández S, González de Cossío T, Hernández Prado B, Sepúlveda J. Encuesta Nacional de Nutrición 1999. Estado nutricional de niños y mujeres en México. Cuernavaca, Morelos, México: Instituto Nacional de Salud Pública, 2001.

Uruguay: Children seen in the health services, 2002.

Data from all other countries is from the Demographic and Health Surveys (DHS) conducted by Macro International or by the Centers for Disease Control and Prevention (CDC).

TABLE 27. Prevalence of breast-feeding initiation and median duration of exclusive and any breast-feeding, selected countries, Region of the Americas.

Country	Year	Breast-feeding initiation (%)	Median duration (months)	
			Exclusive breast-feeding	Any breast-feeding
Bolivia	2003	97.1	4.0	19.6
Brazil	1996	92.5	1.1	7.0
Colombia	2005	97.1	3.7	16.3
Dominican Republic	2002	92.0	0.5	6.6
Ecuador	1999	97.0	2.2	15.5
El Salvador	2002–2003	94.4	1.4	19.2
Guatemala	2002	96.1	3.5	20.5
Haiti	2000	97.4	0.4	18.5
Honduras	2001	96.6	2.3	17.6
Mexico	1999	92.3	NA	9.0
Nicaragua	2001	94.5	2.5	17.6
Paraguay	2004	95.0	Not reported	Not reported
Peru	2005	97.9	3.9	19.6

Source: Nationally representative data. All data from Demographic and Health Surveys, except for Mexico, which is from the Mexican National Institute of Public Health.

disparities within the countries, based on income, rural or urban residence, and ethnicity.

Breast-feeding

Although most women in Latin America breast-feed and do so for a relatively long period of time, breast-feeding practices are far from optimal (Table 27). The duration of exclusive breast-feeding, which is the behavior most closely linked to reductions in infant morbidity and mortality, is well below the six months recommended by WHO (317). National programs in support of breast-feeding have been successful, and the WHO/UNICEF Baby-friendly Hospital Initiative has been widely implemented in the Region. Several countries still do not have in place enforceable legislation on the International Code of Marketing of Breast-milk Substitutes. Only Argentina, Bolivia, Brazil, Costa Rica, the Dominican Republic, Guatemala, Honduras, Panama, Peru, and Uruguay have enacted legislation covering all or nearly all of the Code's provisions. Colombia, Mexico, and Nicaragua have enacted legislation with many of the provisions. Most of the remaining countries have adopted a voluntary health policy code encompassing all or nearly all the Code's provisions, but with no enforcement mechanism.

HIV and Infant Feeding

Mother-to-child transmission of HIV is a growing problem in Latin America and the Caribbean and the main cause of pediatric HIV. Recognizing that breast-feeding is a significant and preventable mode of HIV transmission, UNAIDS, working with WHO

and UNICEF, issued new guidelines on HIV and infant feeding in 2003 (318). The guidelines state that, in order to reduce the risk of HIV transmission to infants while minimizing the risk of other causes of morbidity and mortality, “when replacement feeding is acceptable, feasible, affordable, sustainable, and safe, avoidance of all breast-feeding by HIV-infected mothers is recommended. Otherwise, exclusive breast-feeding is recommended for the first months of life,” but should be discontinued as soon as it is feasible. When a woman is HIV-negative or of unknown status, the recommendation is that she should breast-feed.

Micronutrients

It is estimated that the prevalence of iron deficiency anemia in the Region is 35% in pregnant women and 19% in school-age children. In 19 of 35 countries, iodine deficiency disorders continue to be a public health problem, as 10% of households lack iodinated salt (319). A 1995 report from WHO estimates vitamin A deficiency among preschoolers in the Region at 20% (320). It is estimated that 20% to 30% of the population in the Americas suffers from zinc deficiency (321). Although data are lacking, vitamin B12 and folate deficiency also are likely to be important.

The prevalence of anemia is higher during early infancy and childhood than at any other time in the life cycle. Nationally data from more than eight of the Region's countries show that between 48% and 63% of infants and young children are anemic, and the figure rises to 75% or more among infants 6 to 12 months old. This high prevalence is consistent with data showing dietary iron to be inadequate and of low bioavailability in most complementary feeding diets and a lack of successful iron supplementation pro-

grams in this age group. It also agrees with the extremely high dietary requirement of iron per kg body weight and the low amount of food needed in this age group to meet energy needs (317).

Recent randomized trials showing the effect of iron supplements on motor and language development suggest that improving iron status in iron-deficient populations is likely to yield significant benefits (322, 323). Translating these efficacy studies into successful public health programs remains a challenge. The current emphasis on fortifying staple food with iron will not address the problem of anemia in infants and young children because of the small amounts they consume relative to their high requirements. Moreover, distribution of iron supplements through the health system does not appear to be effective in reducing anemia, most likely because of problems with supply, distribution, and compliance. Therefore, other strategies must be pursued to address this pressing public health problem, including the use of complementary foods fortified with iron and other vitamins and minerals, as well as home fortification.

Night blindness and ocular injuries are the most frequent clinical manifestations of vitamin A deficiency; however, increases in morbidity and mortality in infants and mothers occur at subclinical levels of deficiency. According to WHO's global database, mean serum retinol levels in the Region vary from 0.6 $\mu\text{mol/L}$ to 1.49 $\mu\text{mol/L}$ in children aged 6 months to 7 years (1996–2004). If 10%–20% of the population has serum retinol levels at or below 0.70 $\mu\text{mol/L}$, it is indicative of a moderate public health problem. Using this cutoff, several of the Region's countries have mild or moderate vitamin A deficiencies, and some regions of Brazil, Mexico, and Venezuela present severe deficiencies. Several countries have adopted sugar fortification with vitamin A as a public health strategy for preventing and controlling vitamin A deficiency, others have explored the fortification of oils, and still others use vitamin A delivered through their immunization programs.

A dose of 400 $\mu\text{g/day}$ of folic acid during the three months prior to conception and through the first trimester of pregnancy reduces the incidence of neural tube defects. Wheat flour fortification programs have been adopted by most countries of the Americas to ensure that women of childbearing age receive adequate amounts of folic acid. Such fortification programs have successfully reduced the incidence of neural tube defects in Canada, the United States, Costa Rica, and Chile.

Iodine deficiency disorder is the most common cause of preventable brain damage, cretinism, and mental retardation, as well as endemic goiter and hypothyroidism (324). There are three internationally recognized indicators to monitor iodine nutrition: fraction of homes consuming adequately iodized salt, concentration of iodine in representative urine samples, and the prevalence of goiter (325, 326). Since 2002, 75.1 million persons—10% of the population in the Americas—have been identified as having urinary levels of iodine below the recommended minimum ($<100 \mu\text{g/L}$) (327). The prevalence of urinary iodine excretion $<100 \mu\text{g/L}$ is 21.9% in Guyana, 22% in Mexico, and 13.4% in

Nicaragua. The median urinary iodine excretion for Guatemala, Haiti, and Bolivia is 72 $\mu\text{g/L}$, 43.4 $\mu\text{g/L}$, and 100 $\mu\text{g/L}$, respectively. At the same time, Chile, Brazil, and Ecuador have urinary excretion of iodine in excess of recommended levels ($>300 \mu\text{g/L}$), which is also considered a health hazard (328). Universal iodization of salt has been recommended by different international organizations as a public health strategy to prevent iodine deficiency disorders. Although many countries approved legislation for the fortification of salt with iodine in the 1950s and 1960s, a lack of funding for ongoing quality control systems and inadequate equipment used by small entrepreneurs have delayed the execution or limited the sustainability of these efforts over time.

Although zinc deficiency is difficult to diagnose, using intake estimates and the prevalence of growth retardation it has been estimated that 20% of the population in the Americas is zinc deficient. Based on these Regional estimates, Guatemala, Ecuador, and Honduras have the highest prevalence of zinc deficiency ($\geq 30\%$), followed by Nicaragua, Peru, and Bolivia, with prevalence rates around 20% and 30% (321).

Tackling the Epidemic of Nutrition-related Chronic Diseases in the Americas

Noncommunicable diseases are the leading cause of ill health and death in the Americas. Obesity stands as the most visible and serious risk factor for developing other noncommunicable diseases. Several national surveys in Latin America (329–331) and the Caribbean (332) show that about 50% to 60% of adult men and women are overweight and obese, similar to the levels seen in the United States (333). Moreover, 7% to 12% of children under 5 years old are obese, which represents six times the current percentage of acute malnutrition for that age group. In Mexico and Chile, recent national surveys show that about 15% of adolescents are obese.

Most Latin American and Caribbean countries are experiencing a significant shift in their dietary patterns characterized by a decreased consumption of fruits, vegetables, whole grains, cereals, and legumes and a parallel increased consumption of foods rich in saturated fat, sugars, and salt, such as milk, meats, refined cereals, and processed foods (334). These dietary pattern changes have occurred alongside a decrease in levels of physical activity in the population. Between 30% and 60% of the Region's population does not engage in the minimum recommended level of physical activity (335). Physical inactivity increases with urbanization and age, and is most prevalent among women. Physical inactivity not only contributes to the development of noncommunicable diseases, but also can lead to mental illness, stress accumulation, lower school achievement, and poor social interactions.

A decreased consumption of fruits, vegetables, whole grains, cereals, and legumes, and an increased consumption of energy-dense foods, are influenced by several factors, including urbanization, as well as cost and availability of various foods and taste

preferences. These factors, coupled with intense and highly targeted marketing and advertising, have contributed to a mass consumption of pre-packaged foods and soft drinks, and to eating out, so common in most cities today. In fact, changing food preferences are part of a larger phenomenon, labeled as “diet transition,” which is fueled by higher salaries in cities, time constraints, changes in prices, and ongoing innovations in food technology and distribution systems (336). At the same time the production, availability, and cost of fruits, legumes, vegetables, and cereals have been harmed by this diet transition.

Environmental factors are a powerful influence on individual behaviors, and economic, marketing, and cultural dynamics strongly shape population eating patterns and preferences. Urban design, motorized transportation, and safety influence physical activity patterns and, therefore, must be addressed to ensure that healthy choices become the easiest choices. An environmental approach is becoming a pillar in current public health efforts to tackle the epidemic of noncommunicable diseases (336–339).

Human behavior responds to a variety of factors, not merely to good information or education. Individuals generally consider health issues as one of many factors in deciding what to eat, whether to exercise, or whether to quit smoking. Competing factors include short-term ones such as convenience, time, and price (340). Considering this, the goal is to create enabling environments, so that it is easy to make healthy choices. Enabling environments include institutional set-ups in the workplace and in school, regulations, social norms, prices, taxation, and various incentives. Therefore, public health strategists must consider all factors that lead people to make healthy choices. An enabling environment is all the more important given that impoverished populations in the Americas are the ones who bear the greatest burden of noncommunicable diseases and the ones with the lowest rates of good dietary and physical activity practices. This is true among less developed (341) and among developed countries in the Region (342).

COPING WITH DISASTERS

The years between 2001 and 2005 were characterized by many disasters worldwide: the 2005 hurricane season that buffeted the Caribbean, Central America, and North America, and the tsunami and earthquake in South Asia, are examples of some of the most devastating disasters in the period.

The Americas constitutes one of the world's regions most exposed to natural disasters, and this vulnerability increases the potential risk of destructive effects caused by events of any nature. It is estimated that every year an average of 130 natural disasters of varying degrees of magnitude occur in the Region, and the impact of these destructive phenomena in 2001–2005 has left a toll of some 20,000 deaths, 28 million victims, and US\$ 210 billion in property losses in the Americas (343).

At-risk Populations: Damages and Death Rates

In 2005, approximately 78.8% of the population in the Region lived in large urban centers (344, 345) characterized by a lack of appropriate urban planning and a meager capacity in both public and private institutions for risk reduction and management. In the case of poverty stricken or socially excluded populations, their levels of vulnerability increase on a day-to-day basis due to a scarcity of resources, a lack of suitable locations for their dwellings—which are frequently poorly built or do not follow appropriate construction standards—as well as a lack of access to basic health care services.

The exposure levels of the population to threats are increasingly more difficult to determine. Nevertheless, it is estimated that approximately 73% of the population¹⁵ and 67% of health clinics and hospitals¹⁶ in 18 of the Region's countries¹⁷ are located in high risk areas. This means that in the event of a disaster, millions of people and thousands of health care facilities will be exposed to potential destruction. This, in turn, could create obstacles that prevent the flow of services in disaster situations, increasing the population's vulnerability.

In 2001–2005 the estimated damages attributed to disasters in the Region exceeded US\$ 216 billion, or several times the total gross domestic product of many of the Region's countries.¹⁸ Based on this estimate, 90% of the figure¹⁹ represented estimated damages from disasters in countries such as Canada and the United States, and 10% represented damages in developing countries. The economic impact from each disaster event is proportionate to infrastructure losses in the affected countries. In 2005, for example, hurricanes were responsible for 2,900 deaths, 3 million victims, and approximately US\$ 180 billion in economic losses in the Region. Hurricanes Stan and Wilma together struck Cuba, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, and South Florida in the United States, with losses totaling US\$ 3.6 billion. Hurricane Katrina, which only affected the United States, caused US\$ 176.4 billion in losses, or 98% of total economic losses attributed to hurricanes that year.

Taken together, natural disasters in the Americas in 2001–2005 resulted in 21,500 deaths. It is estimated that hurricanes ac-

¹⁵ **Source:** Relevamiento acerca del Estado de Mitigación y Preparativos para Desastres en el Sector Salud. Área de Preparativos en Caso de Emergencias y Desastres de OPS/OMS – March to July 2006.

¹⁶ **Source:** Relevamiento acerca del Estado de Mitigación y Preparativos para Desastres en el Sector Salud. Área de Preparativos en Caso de Emergencias y Desastres de OPS/OMS – March to July 2006.

¹⁷ The countries included are: Anguilla, Argentina, the Bahamas, Belize, Chile, Colombia, Costa Rica, the Dominican Republic, Ecuador, El Salvador, French Guiana, Guadeloupe, Guatemala, Haiti, Honduras, Martinique, Nicaragua, and the Turks and Caicos Islands.

¹⁸ This amount represents 22 times Bolivia's gross domestic product and 27 times Honduras'.

¹⁹ **Source:** EM-DAT (CRED) – www.em-dat.net.

counted for 25.7% of the total number of natural disasters for the period, affecting 56%²⁰ of the countries of the Region and causing 28.5% of the total number of deaths attributed to natural disasters (6,131 deaths). The destructive power of this force became evident during the 2005 hurricane season in the Caribbean and the United States. Floods followed as the next leading cause of fatalities (5,281 deaths), with their maximum impact in Haiti; and earthquakes (1,381 deaths), with the largest number of victims occurring in two disasters in El Salvador (2001) and one in Peru (2001).

Other disasters in the period that together were responsible for 1,328 deaths included droughts (Guatemala, 2001; Paraguay, 2002); extreme temperatures (cold waves in Argentina, 2001; Mexico, 2002, 2003, 2004; Peru, 2003–2004; heat waves in the United States, 2001, 2002, 2005); and mudslides (in Bolivia, 2003; Brazil, 2002; Colombia, 2001, 2002, 2003; Ecuador, 2002; the United States, 2003; Guatemala, 2002, 2003, 2005; Mexico, 2003; Nicaragua, 2004; and Peru, 2001, 2004).

Elsewhere, transport accidents²¹ accounted for 21.6% of the total for disasters and caused approximately 16.5% of the total 3,560 deaths attributed to disasters in the Region. Industrial accidents and those linked to urban fires and explosions resulted in 2,310 fatalities in 2001–2005. Several disasters of various and of lesser intensity resulted in 1,509 additional deaths.

Impact of Natural Disasters

Hurricanes

In 2001–2005 there were 175 tropical storms in the Caribbean, Central America, and North America, representing the most frequent disaster event in the period. In 2005 alone there were 28 tropical storms, 14 of which became hurricanes, 4 of them category 5 storms. This was considered the most active hurricane season in history.

The destructive force of Hurricane Ivan (affecting Barbados, the United States, Grenada, Haiti, the Cayman Islands, Jamaica, the Dominican Republic, Trinidad and Tobago, and Venezuela) and Hurricane Jeanne (which struck the United States, Haiti, Puerto Rico, and the Dominican Republic) in 2004 was an indication that these kinds of events were increasing not only in number, as reflected in patterns seen in the last 30 years, but also in intensity. This became evident in 2005 with hurricanes Stan, Katrina, and Wilma.

In the Americas, hurricanes left a toll of 6,131 dead, 3,172 injured, more than 14 million homeless, and approximately US\$ 189 billion in losses in 2001–2005. The greatest devastation was recorded in Haiti, with 2,809 deaths and economic losses of approximately US\$ 21 million. These figures are even more devastating when seen in the context of the country's current vulnerability and risk level.

Disasters occurred in areas previously stricken, such as when Wilma devastated Cancún and struck the Maya Riviera in Mexico after Hurricane Emily already had hit those areas in July 2005. Similarly, Hurricane Stan exacerbated damages already caused in El Salvador, Guatemala, Mexico, and, to a lesser extent, in Honduras and Nicaragua. The two latter countries also were affected weeks later by hurricanes Alfa and Beta. Grenada was devastated by hurricanes Ivan (2004) and Emily (2005), with 40 deaths and approximately 60,000 victims.

The Extraordinary Impact of Katrina

Hurricane Katrina (346), which made landfall on the Gulf Coast of North America on August 29, 2005, packing 128 km/hour winds, became the most devastating and costly natural disaster in United States history. The damage inflicted on the city of New Orleans alone amounted to US\$ 176 billion in economic losses and severe damages to the social and economic infrastructures. The National Flood Insurance Program paid out more than US\$ 15.3 billion to hurricane victims who had flood insurance. This amount exceeded the combined total for the 37 years that the program has been in existence.

After an initial delayed response, the weeks-long recovery mobilization was unprecedented in the country. In the aftermath of Hurricane Katrina, some 275,000 citizens in the states of Alabama, Louisiana, Mississippi, and Texas required housing in temporary shelters. The Federal Emergency Management Agency (FEMA) relocated tens of thousands of homeless persons to hotel and motel rooms, while attempts were made to find better housing arrangements for the victims. The official death toll reported was 1,322, but investigations by the U.S. Congress indicated that the toll could have been even higher given the lack of planning and initiative, and a meager capacity to respond to large scale and devastating events.

The health care system in the affected areas was seriously overburdened as demand suddenly spiked and equipment, supplies, and the health services network sustained damages or were disabled. At least 215 people died in extended care facilities and patients with special health care needs were not able to get adequate medical attention. The health sector further deteriorated when several hospitals and health care facilities, including Southeast Louisiana Veterans Hospital, had to be completely evacuated because they were located in areas at high risk for flooding or lacked the necessary resources to provide adequate care for their patients.

²⁰The countries affected by hurricanes in 2001–2005 were: Bahamas, Barbados, Belize, Bermuda, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, El Salvador, Grenada, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Puerto Rico, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago, Turks and Caicos Islands, the United States, and Venezuela.

²¹Includes land, air, and sea transport accidents that resulted in a massive number of victims.

Flooding and Related Consequences

Floods were the second most frequent disaster to strike the Region in 2001–2005—171 floods, or 25.1% of all the events in the period. In the Americas, 85% of the countries and territories were affected, with 5,283 deaths and more than 260,000 persons left homeless; 90% of the floods occurred after heavy and sustained rains in areas made vulnerable by poor land use, areas close to riverbeds, or because of weak levees, as occurred in New Orleans (United States, 2005) and Santa Fe (Argentina, 2003).

Torrential rains also led to other kinds of events. In 2004, for example, the border area between Haiti and the Dominican Republic was devastated by mud- and rockslides after 10 days of heavy rains. In the Dominican Republic the disaster left a death toll of 688, while in Mapou, a city in Haiti located in a valley surrounded by deforested mountains, the rains produced a river of mud and rock that swept away everything in its path. According to authorities 2,665 people perished. Haiti's long history of natural disasters and its humanitarian and political crises have hindered its development and this in turn has stalled improvements in its population's health conditions.

Earthquakes and Volcanoes

Much of the Americas is located in areas with significant earthquake activity and sporadic volcanic eruptions. In 2001–2005, earthquakes were recorded in Chile, the United States, and Mexico, but the greatest damage was reported in El Salvador and Peru.

At the beginning of 2001, El Salvador suffered two large-scale earthquakes in the span of a few weeks, which left 1,259 dead and 8,122 injured, according to figures compiled by the country's National Emergency Committee. The most damage occurred in the poorest areas of the departments of Cuscatlán, La Paz, Morazán, San Salvador, and San Vicente, and in Las Colinas development in the department of La Libertad.

In Peru, an earthquake measuring 8 points on the Richter Scale, with its epicenter on the country's southern coast, shook a large portion of the Andean region. Despite its magnitude, the earthquake generated comparatively less damage than the one in El Salvador. In the Peruvian cities of Arequipa, Moquegua, Tacna, and Ayacucho 145 people lost their lives; 11 more died in two other earthquakes that struck Peru that same year.

Chile, one of the most earthquake-prone countries on the planet, recorded only one earthquake during the period (in 2005), which measured 7 points on the Richter Scale and whose epicenter was in the province of Tarapacá, where 11 people perished.

In the state of Colima, Mexico, a volcano with the same name erupted in 2002, leaving 300 victims. The following year, a violent earthquake shook the same area, destroying hundreds of homes and public facilities, including hospitals, and leaving 29 dead. In Ecuador, the Tungurahua volcano became more active in 2002; it remains active, with phases marked by intense eruptions that by the end of 2005 had affected 174,650 people. Other volcanoes

showing increased activity, although with less damage to the population, were the Fuego (Guatemala, 2002) and Galeras volcanoes (Colombia, 2005). In El Salvador, the Santa Ana volcano spewed incandescent material, gases, and ash that resulted in 2 deaths, 2,000 homeless victims, and several thousands of evacuees in 2005.

Other Disaster Events

Bolivia, Brazil, Cuba, El Salvador, Haiti, Honduras, Mexico, Nicaragua Peru, and the United States experienced droughts during the period. In Guatemala, a prolonged drought affected tens of thousands of people and left a death toll of 42 in 2001. The next year, a large area of Paraguay sustained a drought that resulted in at least 12 deaths. The 2001 drought was attributed to an unusual drop in trade winds that normally arrive at the beginning of April and bring moisture and precipitation from the Pacific Ocean. According to experts, this shift was associated with global atmospheric events, different from those associated with El Niño. The 2001–2002 droughts worsened already difficult conditions in the Region due to the crash in the world price of coffee and other Central American and South American export crops.

For several years, the increasing frequency of extreme temperatures has resulted in hundreds of victims throughout the Americas. Peru was severely affected by cold waves that caused at least 429 deaths in late 2003 and early 2004. In Mexico, 85 deaths between 2002 and 2004 were caused by extreme cold temperatures, whereas in the United States 103 people died from heat waves in 2001, 2002, and 2005.

Impact of Manmade Disasters

The damages resulting from manmade disasters have taken a high toll in human suffering, loss of life, and long-term damage. Fires in urban areas were responsible for 1,557 deaths and thousands of injuries in 2001–2005, including many fires in shopping centers, discothèques, prisons, and hospitals in South America and Central America.

One of the largest fires recorded in the period occurred in Peru on December 29, 2001, at a shopping center in downtown Lima. The conflagration was caused by a chain reaction when tons of fireworks were set off, spreading flames across hundreds of vendor stalls packed together. In a few minutes the fire had engulfed four city blocks in the shopping area, making it impossible for hundreds of vendors and customers to escape. First responders, physicians, nurses, and emergency response teams carried out rescue operations, stabilized the burn victims, and transported the wounded to hospitals, which had been put on red alert by the Ministry of Health. The fire lasted seven hours; 277 bodies were recovered, 117 human remains were taken to the Institute of Forensic Medicine to be identified; 247 victims were hospitalized for burns, asphyxia, and multiple traumas; and the Civil Defense Agency reported 180 missing.

On August 1, 2004, a raging fire broke out in a supermarket in Asunción, Paraguay, spreading quickly and generating panic; the doors in the facility were locked and more than 1,000 people were trapped. Paraguayan authorities reported that in 364 bodies had been found, as well as 42 unidentified human remains; 48 persons were missing and 298 were hospitalized. The leading cause of death in the fire was smoke inhalation, followed by burns.

On December 30, 2004, in Buenos Aires, Argentina, 48 ambulances, 8 firefighting units, 110 Civil Defense teams, and more than 600 personnel including medical staff, paramedics, and volunteers mobilized to rescue, treat, and transport hundreds of victims of a fire at a discothèque where 2,000 young people had gathered. Authorities confirmed that 194 people died and 714 were injured.

In the early morning of July 12, 2005, a fire broke out at a hospital in San José, Costa Rica; 19 people lost their lives, monetary losses reached US\$ 17 million, and the hospital (which contained highly sophisticated equipment and 522 beds) was forced to shut down, except for the emergency medical facility that served as a temporary hospital for evacuating patients.

Five fires broke out in prisons in Argentina, the Dominican Republic, and Honduras, leaving a death toll of 387. The two most deadly took place at the prison in Higuey, Dominican Republic, in 2005, with 136 dead, followed by the fire at the prison in San Pedro Sula, Honduras, in 2004, with a toll of 104. During the reporting period several coal mine explosions occurred in Argentina (2004), Colombia (2001), Mexico (2002), and the United States (2001). Two explosions followed by fires occurred at the oil refineries in Campos, Brazil, and in Houston, Texas (United States), in 2001 and 2005, respectively, which caused the deaths of 65 people.

Transport-related accidents²² accounted for 145 incidents and constituted the third most frequent disaster event in the Region. On September 11, 2001, terrorism was responsible for the attacks on the World Trade Center in New York; the Pentagon in Washington, D.C.; and a rural Pennsylvania area. This event resulted in 2,973 deaths and led to the formulation of policies and international agreements aimed at intensifying security measures, including closely monitoring and restricting financial flows.

Impact of Disasters on the Health Care System

Impact on Health

The damage and disruption produced by catastrophic events can increase the risk of infectious diseases, mainly due to population displacements, overcrowding, a drop in the amount or quality of clean water, disruptions in wastewater and solid waste disposal, inadequate handling of food products, and the health

services network's reduced response capability. Fortunately, no outbreaks of epidemics have resulted from the disasters reported in the Region; overall, the countries have responded, particularly their health sectors, and they have succeeded in adequately controlling potential risk factors.

One of the priorities established was to attend to the health needs of the victim population, particularly by providing care, early detection, and timely treatment for cases of dengue, typhoid fever, malaria, cholera, gastroenteritis, leptospirosis, Chagas' disease, and hepatitis A, mainly to flood stricken communities (347) and in endemic areas in Belize and Nicaragua.

The damaging effects on mental health were evident in every disaster. In El Salvador, the two closely spaced, large earthquakes and the scores of aftershocks that followed affected the population's mental health. In the ensuing weeks, more than 8,000 medical consultations for depression and anxiety disorders were reported in the country.

Impact on the Health Services Infrastructure

Many health care facilities sustained structural damage and damage to their equipment and operations. In addition to their direct damages, many health care facilities had great difficulty in providing medical treatment because of the disruption of public utilities, including electricity, water, communications, sewage, solid waste management, and hospital care services; damaged roads also impaired access in some cases. The increased demand for medical treatment in a catastrophic event's aftermath had to be diverted to hospitals or other health care facilities in unaffected areas, and this, in turn, had medium- and long-term consequences for the health care services networks (348).

In 2001–2005, more than 100 hospitals and at least 1,000 health care centers in the Region suffered damages as a result of natural disasters. For example, in El Salvador 19 hospitals (63% of the national capacity) were damaged during the 2001 earthquakes, 4 of which had to be completely evacuated; after several years, medical services were still being provided in makeshift facilities and tents. Other earthquakes in Costa Rica's southern Pacific (Golfito) and central Pacific (Parrita) regions in 2003 and 2004, respectively, damaged two clinics and various child nutrition centers. In the region of Siquirres, Costa Rica (2005), at least 16 clinics and some primary care centers suffered equipment losses as well as various other kinds of damage.

In Jamaica, during Hurricane Ivan (2004), 124 (36%) of the approximately 343 health care centers suffered various kinds of damages. The Ministry of Health kept 93% (319) of the medical centers operating, while the remaining 7% (24) of the centers and 35% of the public hospitals were shut down either because they were severely damaged or because the access roads to them were damaged.

As hurricanes Frances, Ivan, and Jeanne swept through the city of Gonaïves, on Haiti's northern coast, parts of the city were subjected to a torrential mudslide and flooding that raised the

²²Includes land, air, and sea transport accidents with a massive number of victims.

water level to 3 m, which put the main hospital in the city of La Providence out of service. All health care facilities in Grenada were unable to operate after Hurricane Ivan in 2004. In May 2004, in the city of Santa Fe, Argentina, the Dr. Orlando Alassia Children's Hospital and the Vera Candiotti Rehabilitation Hospital sustained the most severe damage, remaining submerged for several days. Shutting down these two specialized hospitals lost 170 beds (13% of the available beds in the affected area). In addition, 14 other primary health care facilities were partially flooded.

Disasters and large-scale medical emergencies can create chaos in a country's health care system; they also can create opportunities for implementing risk-reduction measures and improving disaster preparedness, however. Such was the case with the Benjamín Bloom Children's Hospital in El Salvador, which, after suffering damages from a severe earthquake in 1986, was repaired in accordance with earthquake-resistant construction standards. In 2001, the hospital suffered only minor damage, and was operating at its maximum capacity immediately after the earthquakes struck that year, serving as a referral center and treating patients from more than 19 other damaged facilities.

Overall Risk Patterns

Indiscriminate and intense exploitation of natural resources, pronounced land degradation, and deforestation have adversely affected the capabilities of ecosystems to regenerate and offset direct and indirect human activity (349). Moreover, such factors as inadequate urban planning, increased migration from rural areas to large cities, poor handling of hazardous substances, and the increase in the number of poor populations have brought low-income populations to live in at-risk areas. As a result, adverse events wreaked greater destruction in 2001–2005.

Hurricane-related disasters increased 80%, although the number of destructive hurricanes only increased by 14% in 2001–2005 (25 hurricanes and 88 disasters) compared with 1996–2000 (22 hurricanes and 49 disasters). Floods increased by 48%, from 113 (1996–2000) to 168 (2001–2005). Manmade disasters (technological and transportation-related accidents) showed a slight increase, continuing with the trend of the last 30 years.

There is international consensus that the increase in the number of disasters presents a challenge that nations must face with additional and better tools, if they are to reduce risks and improve response capabilities. More than a decade after the International Conference on Disaster Mitigation for Health Care Facilities was held in Mexico in 1996, at least 21 countries in the Americas have conducted risk assessments, while many others have implemented risk-reduction measures in health care facilities to address natural disasters.

The ministers of health assessed the damage inflicted by the disasters on health services and agreed, in September 2004, that all hospitals currently in operation needed to be structurally reinforced, while new facilities would have to be designed and built in a way that would ensure that they could remain operational

during disasters. This agreement signaled the beginning of a Regional policy initiative of "safe hospitals" that was ratified and supported by more than 169 countries at the Global Conference on Disaster Reduction in 2005. The agreement stipulates that each country should maintain a national safe hospitals policy, and a target date of 2015 was set to ensure that newly built hospitals be disaster proof and that current health care facilities be structurally reinforced, especially those that provide primary care.

Conclusions

The Region's population as a civic society needs to address its own vulnerabilities as it grapples with an increasing number of disasters (350, 351).

Evidence gathered in the last few years related to disasters shows an increasing pattern of natural events and those caused by human activity. Some of the leading causes of this pattern include climate change, technology development, inappropriate exploitation of natural resources, and an increase in low-income human settlements in areas considered at risk.

Addressing risk is a complicated issue that requires complex and comprehensive measures. Managing disaster risks in the Americas should include measures that range from political and economic issues to biodiversity and environmental protection. Risk management, the determination of threats, and risk assessments are crucial steps for developing the policies, strategies, plans, and programs required for managing risks and coping with disasters that involve a wider participation of public and private institutions and the voice of the affected communities. In addressing current risks, the nations and territories of the Americas should review and update their multisectoral and sectoral plans, train the population and response teams located in the areas potentially at risk, and ensure the availability of financial and material resources required to implement risk-reduction measures, humanitarian assistance, and early recovery.

The vast experience within the Region in coping with natural and human-caused disasters has shown that there are no shortcuts that can lead to successful disaster reduction. Rather, this long process is linked to sustainable development. Countries must follow an approach in which the progress in disaster reduction is attained when it is understood that managing disasters requires taking responsibility for development and planning. This, in turn, requires interdisciplinary efforts and a shared commitment by all of civil society.

In a framework of Pan-American solidarity, almost every country and ministry of health of the Americas has adopted formal measures aimed at continuously improving risk-reduction and disaster-preparedness measures. As a result, countries have generated the capabilities to respond to minor and moderate disasters. It will be necessary to constantly reinforce that capability, however, and obtain the necessary political commitment to coordinate the health care sector and other key actors and, thus, be

TABLE 28. Estimates of the indigenous population, total and as a percentage of the total population, selected countries, Region of the Americas.

Percentage of total population	Total indigenous population		
	<100,000	100,000 to 500,000	>500,000
More than 40			Peru Guatemala Bolivia Ecuador
5–40	Guyana Belize Suriname	El Salvador Nicaragua Panama	Mexico Chile Honduras
Under 5	Costa Rica French Guiana Jamaica Dominica	Argentina Brazil Paraguay Venezuela	Canada Colombia United States of America

Note: The table refers to official national statistics showing indigenous peoples as majorities “ or “minorities”; however, there may be pockets within countries where indigenous populations comprise a majority in that area that are not reflected in the national figures.

Sources: Reports on the Evaluation of the International Decade of the Indigenous Peoples of the World, PAHO, 2004. Hall G, Patrinos AH. Indigenous Peoples, Poverty and Human Development in Latin America: 1994–2004. Washington, DC: World Bank, 2005. Montenegro R, Stephens C. Indigenous Health in Latin America and the Caribbean [Indigenous Health 2]. Lancet 2006;367:1859–69.

able to address unforeseen circumstances and large scale disasters. In this way not only will they be able to respond and provide humanitarian assistance, but also to reduce the potential risk of emergencies and disasters.

HEALTH OF SPECIAL GROUPS

INDIGENOUS PEOPLES

Between 45 million and 50 million indigenous people belonging to more than 600 ethnic groups live in the Americas today,²³ comprising almost 10% of the total population and 40% of the rural population of Latin America and the Caribbean (352–355). Indigenous peoples add much vitality and diversity to the 24 countries of the Region in which they live, and are the repositories of much of the Americas’ cultural heritage and biodiversity (Table 28) (352). Despite their historic presence and invaluable contributions, indigenous peoples are highly vulnerable in the countries where they live, and their human rights, as well as their

social, political, and economic equality, are often compromised or denied. As a result, pervasive inequities exist in the living conditions, health status, and health service coverage of indigenous peoples as compared to the rest of the population (Table 29) (352–356).

The incidence of poverty and extreme poverty is much higher among indigenous peoples in the Americas than among non-indigenous groups. In Bolivia and Guatemala, for instance, more than half of the total population is poor, but almost three-quarters of the indigenous population is poor. Of all poor households in Peru, 43% are indigenous (353). Poverty is intertwined with other compounding factors, such as significantly higher illiteracy and unemployment rates, lack of access to or availability of social services, violations of human rights, displacements due to armed conflicts, and environmental degradation. In indigenous municipalities in Mexico, the rate of illiteracy is 43%, more than three-fold that of the national average; the rate is more than 60% among indigenous women (353, 357). High levels of toxic contaminants have been recorded in several indigenous communities. In Canada’s Arctic regions, studies of infant development among the Nunavik have linked deficits in immune function, an increase in childhood respiratory infections, and low birthweight to prenatal exposure to organochlorides (358, 359).

Traditionally, indigenous populations have suffered from disproportionately high rates of maternal and infant mortality, malnutrition, and infectious diseases. The maternal mortality ratio in Guatemala, a country with 42% indigenous population, is among the highest in Latin America, and it is higher still among

²³ILO Convention 169, Article 1, concerning Indigenous and Tribal Peoples in Independent Countries (1989), recognizes as indigenous that distinct section of the national community which is understood to consist of: “... peoples in independent countries who are regarded as indigenous on account of their descent from the populations which inhabited the country, or a geographical region to which the country belongs, at the time of conquest or colonization or the establishment of present state boundaries and who, irrespective of their legal status, retain some or all of their own social, economic, cultural, and political institutions.” The concept of a *people* refers to the set of traits that characterize a human group in territorial, historical, cultural, and ethnic terms and give it a sense of identity.

TABLE 29. Inequities affecting indigenous populations in terms of the Millennium Development Goals, selected countries, Region of the Americas.

Issue	Country	Indigenous	Nonindigenous
1. Poverty	Canada Chile	34% (2004) 32.2% (2000)	16% (2004) 20.1% (2000)
2. Illiteracy	Bolivia	19.61% (2001)	4.5% (2001) (2001 census)
3. Gender equity and women's independence	Guatemala	Illiteracy among indigenous women is between 50% and 90%, and only 43% finish elementary school, 5.8% finish high school, and 1% get a higher education (2001).	
4. Infant mortality	Panama	Bocas del Toro 37.6; Darién 29.2; Comarca Nögbé-Buglé 27.9/1,000 live births (2003)	15.2/1,000 live births 2003
5. Maternal mortality	Honduras	255/100,000 live births (Intibuca)	147/100,000 live births (data from the 2004 Honduras report)
6. Fight against malaria, HIV/AIDS, and other diseases	Nicaragua	90% of the cases of malaria by <i>P. falciparum</i> are concentrated in 24 municipalities with indigenous populations.	
7. Environmental sustainability and nutritional status	El Salvador	95% of surface water sources are contaminated; malnutrition in children and adults is associated with parasites; 40% of indigenous children suffer malnutrition, compared to 20% nationally.	
8. Fostering of a global partnership for development		The presence of similar problems among indigenous peoples (i.e., similar epidemiological profiles, refugees' status, lifestyle changes, acculturation, lags in development, loss of territory), particularly those living in border areas, makes it critical to coordinate work towards development and application of international and subregional agreements.	

Note: This table responds to the need for applying the content of the Millennium Development Goals to the realities of indigenous peoples and shows the burden of disease and inequity that affects them in the Americas. Real compliance with these statements, as is called for by the indigenous leaders, will require that indigenous peoples' views, such as those about poverty, alliance, and development, be taken into consideration.

Source: Data provided by the countries participating in the national evaluation of health achievements within the framework of the International Decade of Indigenous Peoples of the World, PAHO, 2004.

indigenous women. Actually, the latter is three times (211 per 100,000 live births) the rate of non-indigenous mothers (70 per 100,000 live births), according to the Baseline Maternal Mortality study for 2000 (360, 361). In Bolivia, the average infant mortality rate is 102 per 1,000 live births in 51 rural municipalities with more than 50% native monolingual women, or more than twice the rate of 54 per 1,000 live births for the general population (362). Malnutrition among indigenous children in the northern part of Argentina is the leading cause of morbidity and mortality; 80% of the cases of child malnutrition are due to parasitosis linked to precarious environmental sanitation conditions (352). In Mexico, mortality rates from pulmonary tuberculosis among the indigenous population are twice those in the general population (363), and in Canada, the tuberculosis rate is 8 to 10 times higher than the national average (352).

In Nicaragua 90% of the cases of malaria by *Plasmodium falciparum* are concentrated in 24 municipalities with indigenous populations. In 2002, in Brazil's Special Indigenous Health Districts, respiratory diseases were the second leading cause of health services demand. Moreover, 81.5% of deaths from pneumonia affected children under 5 years of age and 48.2%, children under 1 year of age, showing the importance of this disease in infant mortality among Brazil's indigenous population (352).

As these populations become increasingly more mobile, less isolated, more urban, and more likely to reside in border areas, chronic disease and such issues as drug and alcohol use, suicide, sexually transmitted diseases, and the loss of influence of traditional health practices become increasingly important. In 1999, a study that included data from population censuses, interviews, clinical data, and biochemical evaluations was conducted among

80 men and 71 women in selected Guaraní-Mbyá communities (Sapukai, Paraty-Mirim, and Araponga) in the state of Rio de Janeiro, Brazil; the prevalence of selected risk factors in the overall sample was as follows for the three communities, respectively: hypertension (4.8%, 2.6%, and 7.4%); overweight (26.7%, 19.5%, and 34.8%); high total cholesterol levels (2.8%, 2.7%, and 2.9%); and increased triglyceride levels (12.6%, 9.5%, and 15.9%). All prevalence rates were higher among women and at older ages. Results suggest that Guaraní communities have a moderate risk of chronic diseases and that measures to reduce these risk factors should be adopted (364). Furthermore, although the prevalence of cardiovascular diseases has been declining in Canada, there are data to suggest that the cardiovascular disease rates are increasing among aboriginal people in that country. In a study conducted among randomly selected participants from a comprehensive list of 301 Six Nations Band members and 326 people of European origin, it was reported that aboriginal people had significantly more carotid atherosclerosis than individuals of European descent. These problems were linked to higher rates of smoking, glucose intolerance, obesity, abdominal obesity, and substantially higher concentrations of fibrinogen and plasminogen activator inhibitor-1, and to significantly higher rates of unemployment and a lower annual household income (365).

Available data on alcohol consumption among indigenous peoples in Latin America and the Caribbean are limited, but sufficient to show the severity of the problem. In Peru, a 2000 study conducted in several Aymara altiplano communities of Puno and Shipibo Amazonian communities reported that alcohol consumption was predominant among males, and associated with aggressive behavior towards their wives, children, and other close relatives (366). Several reports suggest growing alcohol consumption among the urban indigenous population. Particularly troubling is the increase in alcoholism among indigenous women in special situations, such as widowhood, abandonment, uprooting, and solitude (367–369).

In recent decades, the Garífunas' search for work has increasingly taken them to the Honduran cities of La Ceiba or San Pedro Sula, and even to New York, Los Angeles, and New Orleans; even London now has a Garífuna community. This diaspora intensified in the 1990s, as foreign and domestic investors bought up Garífuna property for tourism development. The cumulative rate of AIDS among the Garífunas in Honduras is nearly 15 times the national rate. More than 8% of adult Garífunas test HIV positive, four times higher than the national average (370).

The increasing number of suicides among young indigenous people in Colombia's northwest is generating much concern in the United Nations Refugee Agency (UNHCR) and indigenous people organizations. In a little over a year, 17 young Embera and Wounaan people 12 to 24 years old committed suicide or attempted to commit suicide. According to the indigenous organization CAMIZBA (Asociación de Cabildos Mayores Indígenas del Bajo Atrato, composed of 25 communities of the Wounaan, Embera, Katío, Tule, and Chamí peoples), young indigenous peo-

ple are losing "the desire for life" due to the effect that the Colombian conflict has had on their communities (371).

Approximately 30 years ago, lobster and shrimp commercial fishing began in the Atlantic Coast of Honduras and Nicaragua (372–374). The endeavor is performed under precarious conditions without proper diving gear, and it has resulted in a high rate of disability and death among adolescent and young adult Miskitos, and in social problems and an ecological imbalance created by indiscriminate lobster fishing (373–375). The age of those suffering from decompression disease was found to be 20–41 years (376).

Although the burden of disease and the transitional-stage epidemiological profile of indigenous peoples are similar to those of other disadvantaged groups in the Region, the poor health status of the former is compounded by discrimination and inequity within the health system. Part of the challenge in offsetting these disparities is to better link the indigenous health system and its multiple health agents and practices with public health services offered by the governments. These communities depend upon traditional and spiritual healers to promote health, prevent illness, and provide treatment for common conditions; they are often the only health care provider available on a continuing basis (352).

Gender inequalities also are present, and indigenous women in particular face challenges in obtaining quality health care for reproductive health. For example, the prevalence rate of contraceptive use among indigenous women in Guatemala is 10%, whereas the national average is 40%. In that same country, 41% of deliveries are assisted by trained health personnel at the national level; the rates are 57% among non-indigenous women and 16.4% among indigenous women (360, 361, 377).

Although low-quality health services are present in many developing country contexts, the weaknesses are more acute in areas inhabited by indigenous peoples. Persistent issues of poor quality in service provision, such as limited staff competency, noncompliance with evidence-based treatment protocols, medication shortages, and low staff retention rates, are common in many of the remote locations in which indigenous peoples live. Additionally, geographic barriers prevent these populations from gaining access to health care, due to distance, means and affordability of transportation, and seasonal geographic isolation. Although health care services are largely free to indigenous peoples, the real cost of care, including out-of-pocket expenses related to transportation, food, accommodation, family care, medication, and loss of workdays, pose a challenge to their access to health care (352, 378–380).

Cultural barriers are the most complicated challenge, since there is little understanding of the social and cultural factors deriving from the knowledge, attitudes, and practices in health of indigenous peoples. The bias of Western medicine and intervention can be offensive or inappropriate for traditional medicine practitioners. Finding health staff that speak and understand indigenous languages is difficult, and poor communication between providers and clients at all levels compromises access to quality

BOX 5. International Labor Organization Convention (No. 169) Concerning Indigenous and Tribal Peoples in Independent Countries

Part V. Social and Health Security

Article 24

Social security schemes shall be extended progressively to cover the peoples concerned, and applied without discrimination against them.

Article 25

1. Governments shall ensure that adequate health services are made available to the peoples concerned, or shall provide them with resources to allow them to design and deliver such services under their own responsibility and control, so that they may enjoy the highest attainable standard of physical and mental health.
2. Health services shall, to the extent possible, be community-based. These services shall be planned and administered in co-operation with the peoples concerned and take into account their economic, geographic, social and cultural conditions as well as their traditional preventive care, healing practices and medicines.
3. The health care system shall give preference to the training and employment of local community health workers, and focus on primary health care while maintaining strong links with other levels of health care services.
4. The provision of such health services shall be co-coordinated with other social, economic and cultural measures in the country.

Source: International Labor Organization. International Labor Norms. C169 Indigenous and Tribal Peoples Convention, 1989 [Internet site]. Available at <http://www.ilo.org/ilolex/cgi.lex/convde.pl?C169>.

care. Moreover, indigenous people are often discriminated against in health centers by non-indigenous staff, and both fear and distrust caused by the attitudes and behaviors of health care workers prevent indigenous people from seeking the health care they need (381, 382). For example, traditional beliefs and practices related to childbirth are frequently not respected in institutional settings (383, 384). At the policy level, lack of vital statistics or breakdown by ethnic groups, gender, and age makes the generation of evidence-based policies and managerial processes more difficult. An analysis presented by the Economic Commission for Latin America and the Caribbean indicates that 13 out of the 24 countries with indigenous populations that have conducted population censuses in recent years have incorporated questions designed to identify indigenous populations. Furthermore, 10 countries of the Region have already processed their most recent censuses, and relevant studies on indigenous populations are being carried out (385). In terms of vital and service coverage statistics, although studies and estimates have been carried out, there is not an adequate characterization of the indigenous peoples of the Region, and certainly not a reliable system of information, monitoring, and evaluation of their health conditions (352).

National policies and international agreements guide some countries in their development of indigenous-focused programs and designate funding specifically for indigenous social services.

Argentina, Bolivia, Brazil, Colombia, Costa Rica, Chile, Ecuador, Guatemala, Guyana, Mexico, Nicaragua, Panama, Paraguay, Peru, and Venezuela have included an acknowledgment of diversity in their Constitutions. The promotion of indigenous people's health and the incorporation of indigenous traditional medicine into national health systems is part of the national legislation of Argentina, Bolivia, Brazil, Colombia, Ecuador, Mexico, Nicaragua, Panama, Peru, and Venezuela (386). Most countries report that they have technical units devoted to indigenous health affairs within their ministries of health and that they have national programs or projects in place regarding the health of indigenous peoples. However, the implementation of these policies and experiences is largely uncoordinated and does not include consistent indigenous participation in the formation or implementation of these efforts as stated, for instance, by Convention 169 of the International Labor Organization (Box 5) (369). A lack of communication, as well as the fragmentation or duplication of efforts at every level, impedes the dissemination of lessons learned and restricts the systematization and use of information to deliver end products to society. In addition, issues such as collective property rights, patents, biodiversity protection, and conservation have not been adequately addressed (352).

Aware of health disparities, in 2000, the Region's countries committed themselves to reducing gaps through the achievement

BOX 6. Objectives of the Second International Decade of the World's Indigenous Peoples

- (1) Promoting nondiscrimination and inclusion of indigenous peoples in the design, implementation, and evaluation of international, regional, and national processes regarding laws, policies, resources, programs, and projects.
- (2) Promoting full and effective participation of indigenous peoples in decisions which directly or indirectly affect their lifestyles, traditional lands, and territories, their cultural integrity as indigenous peoples with collective rights or any other aspect of their lives, considering the principle of free, prior, and informed consent.
- (3) Redefining development policies that depart from a vision of equity and that are culturally appropriate, including respect for the cultural and linguistic diversity of indigenous peoples.
- (4) Adopting targeted policies, programs, projects, and budgets for the development of indigenous peoples, including concrete benchmarks, with particular emphasis on indigenous women, children, and youth.
- (5) Developing strong monitoring mechanisms and enhancing accountability at the international, regional, and particularly the national level, regarding the implementation of legal, policy, and operational frameworks for the protection of indigenous peoples and the improvement of their lives.

Source: United Nations Permanent Forum on Indigenous Issues. Second International Decade of the World's Indigenous People [Internet site]. Available at: <http://www.un.org/esa/socdev/unpfii/en/second.html>.

of the Millennium Development Goals (MDGs). However, evaluations in the Americas and recent projections show that although there have been some gains in the health sector, expected results will not be reached in time nor in form, especially among indigenous populations, unless certain current strategies are reoriented. For instance, poverty reduction and economic development strategies do not consider indigenous identities, world views, and cultures; the right to self-determination; the right of indigenous peoples to control their territories and resources; and the indigenous peoples' holistic perspective of health. Currently, the assessment of progress toward the MDGs is based on averages, not on disaggregated data; progress (or lack thereof) of indigenous populations is, therefore, lost in the calculations (387).

In December 2004, the General Assembly of the United Nations Permanent Forum on Indigenous Issues adopted a resolution for a Second International Decade of the World's Indigenous Peoples (2005–2015). The decade's goal is to further strengthen international cooperation for solving problems faced by indigenous peoples in such areas as culture, education, health, human rights, the environment, and economic and social development, through action-oriented programs and specific projects, increased technical assistance, and relevant standard-setting activities (Box 6) (388).

In acknowledging the priorities of indigenous peoples, PAHO and the Member Countries have recognized the urgent need to move forward with innovative and respectful ways of working with indigenous representatives and to show clear results that

can demonstrate the reduction of the burden of disease and disability, and of barriers of access to quality health care for indigenous communities. This process will adhere to along the following 2007–2011 strategic lines of action (389): 1) to ensure that indigenous perspectives will be incorporated into the attainment of the MDGs and national health policies; 2) to improve information and knowledge management on indigenous health issues to strengthen regional and national evidence-based decision-making and monitoring capabilities; 3) to integrate the intercultural approach into the national health systems of the Region as part of the primary health care strategy; and 4) to develop strategic alliances with indigenous peoples and other key stakeholders to further advance the health of indigenous peoples.

AFRO-DESCENDANT POPULATIONS

The Region of the Americas is enriched by its great ethnic and cultural diversity, inherited from its sociological and historic processes of conquest, colonialism, and immigration. In addition to the indigenous populations analyzed in the previous section, an estimated 250 million Afro-descendants live in the Americas. Afro-descendants make up more than 45% of the population of the English-speaking Caribbean, Brazil, Haiti, and the Dominican Republic. Brazil has the largest Afro-descendant population in the Region, with an official count of roughly 75 million persons; the United States is home to 36 million Afro-descendants (12.9% of the population); and Colombia has approximately 8 million (23%).

TABLE 30. Household type, by ethnic group and sex of household head, Brazil, 2001.

Type of household	Households headed by an Afro-descendant (%)			Other households (%)		
	Males	Females	Total	Males	Females	Total
Single-person homes	6.8	15.6	8.9	6.0	23.4	10.3
Two-parent nuclear families	71.8	7.2	56.2	76.7	7.8	59.8
Single-parent nuclear families	1.8	39.0	10.8	1.7	38.7	10.8
Extended and mixed families	19.5	38.1	24.0	15.7	30.1	19.2
Total	100	100	100	100	100	100

Source: Data from Pesquisa Nacional por Amostra de Domicílios (household survey) 2001. Developed by PAHO.

Despite its size, this segment of the population has been socially invisible since the independence era, due to characteristics such as its high rate of urbanization and the loss, in most countries, of a linguistic identity. Most countries have not had specific data on their Afro-descendant populations. Thanks to efforts launched at the beginning of the 1990s with the support of financial institutions and United Nations agencies, a handful of countries (Brazil, Costa Rica, Colombia,²⁴ Ecuador, Guatemala, Honduras, and Trinidad and Tobago) have designated Afro-descendants as an ethnic category in statistical sources. Disaggregated information from the aforementioned countries' censuses and household surveys can be used to analyze the living and health conditions of this population group. In the future, this will make it possible to monitor the extent to which policies improve the quality of life of Afro-descendants.

PAHO's analysis of the aforementioned statistical information confirms that Afro-descendants in South America live in high-risk conditions similar to those affecting indigenous communities. In Ecuador, for example, 52% of Afro-descendants live in poverty, which is similar to poverty rates in the indigenous population. In Brazil, 52% of Afro-Brazilians are poor, compared to 26% of the general population. In Colombia, indigenous people suffer the highest rates of poverty and indigence, followed by the Afro-Colombian population (39%). Importantly, the poverty distribution by ethnicity is coupled with gender-based differences in household structure. Female-headed extended families are overrepresented in the Afro-descendant population (Table 30).

This situation, which is common to this population group in several countries, points up the great social exclusion that Afro-descendants have endured for centuries, which affects all aspects of life, and is manifested in other indicators. For example, in Ecuador, 78% of Afro-descendant males and 80% of females 15–19 years old have completed six years of schooling, compared to 87% of their peers in non-ethnic groups. In Brazil, this gap is even wider. For the same age group, only 56.2% and 66% of Afro-descendant males and females, respectively, have completed six

years of school, compared to 80.9% of males and 85.2% of females in the rest of the population.

The situation of Afro-descendants in Central America is not quite so dire. In Honduras, Afro-descendants²⁵ account for 5% of the total population; they live primarily in cities along the Atlantic Coast, including Tela, La Ceiba, Puerto Cortes, and Puerto Castilla. In Honduras, poverty, as measured by unmet basic needs, is less severe among Afro-descendants than indigenous people: 42% of Afro-Hondurans have one or more unmet basic needs, compared to 78% among the indigenous population. Educational attainment, as measured by the percentage of youth 15–19 years old who have completed six years of school, is also higher in the Afro-descendant population than in the indigenous population or the rest of the population (Figure 30).

There is a lack of data in regard to health indicators, because up until very recently the countries' health information systems did not record the ethnic origin of Afro-descendants. As a result, the data cannot be disaggregated. Studies that draw on other sources reveal significant disparities in living conditions and access to services to the detriment of Afro-descendants.²⁶

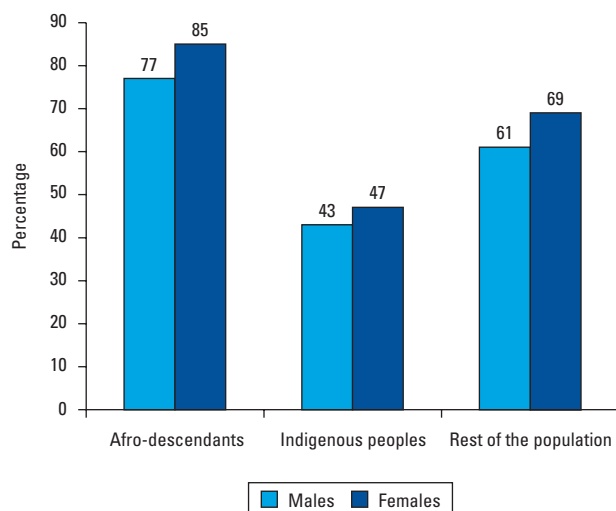
With regard to infant mortality, the rate in the Afro-descendant population in Ecuador is higher (32.6 deaths per 1,000 live births) than that in the non-ethnic population (25.8), according to data from the 2001 census. The gap remains even when data are disaggregated by urban area (29.3 among Afro-descendants and 21.3 among non-ethnic groups) and rural area (39.4 and 32.9, respectively). In Brazil, according to the 2000 census, the infant mortality rate in the Afro-descendant population is higher (37.6 deaths per 1,000 live births) than that in the rest of the population (25.0). Colombia's infant mortality rate is close to the Latin American average. In the department of Chocó, however, where Afro-descendants are the majority of the population (70%), male infant mortality rates are three times higher than the national average (98.6 deaths per 1,000 live births) and female infant mortality rates are four times higher (80.9) (Figure

²⁴ As information from Colombia's 2005 Census is not yet available, data was taken from the following publication: Situación de salud en Colombia. Indicadores Básicos 2003, Instituto Nacional de Salud Ministerio de Promoción Social y OPS. Bogotá, Colombia, 2003.

²⁵ The Afro-Honduran population descends from Africans who came to the country from Saint Vincent and the Grenadines and mixed with indigenous Caribs and Arawaks.

²⁶ For more information on this topic, see PAHO, *Health in the Americas, 2002 edition* (pp. 105–106). PAHO, Washington, D.C., 2002.

FIGURE 30. Percentage of the population 15–19 years old that completed six years of schooling, by ethnicity and sex, Honduras, 2001.



Source: 2001 Population Census, prepared by PAHO.

31); these figures are higher than those in Haiti (79 deaths per 1,000 live births), India (65), and Kenya (68).

In Honduras, the mortality rate for children under 5 is higher in urban Afro-descendant populations (30.7 deaths per 1,000 live births) than in urban indigenous populations (21.3) and non-ethnic populations (25.3).

The risk of dying from HIV-infection and diseases linked to poverty varies by ethnicity and sex. In Honduras, more than 8% of adults in the Garifuna population are HIV-positive, compared

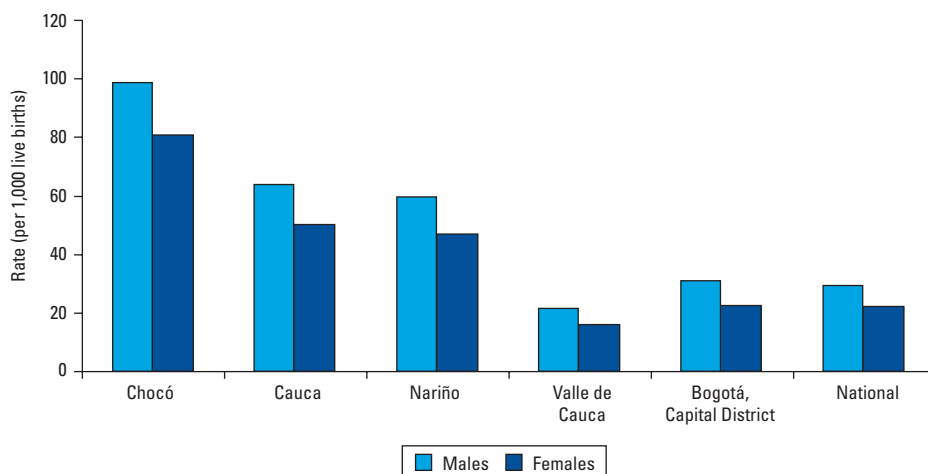
with a national average of 2%, and the cumulative rate of HIV infection is nearly 15 times the national average among Garifunas. In Brazil, the Government adopted a policy of universal, free access to antiretroviral therapy in 1998. Since then, in the state of São Paulo, white men have seen their mortality risk fall considerably, but their Afro-descendant counterparts have not seen such an improvement; the mortality risk is similarly higher among women of African descent than among white women (Figure 32).

With regard to water supply, the 2000 censuses indicate that Afro-descendants have less access than does the non-ethnic population. In Brazil, 85.4% of Afro-Brazilians have adequate access to drinking water, compared to 92% in the non-ethnic population. In Ecuador, 66% of Afro-Ecuadorians have access to drinking water, compared to 69% of the non-ethnic population. Afro-Hondurans have nearly the same access as the non-ethnic population (74% vs. 73%).

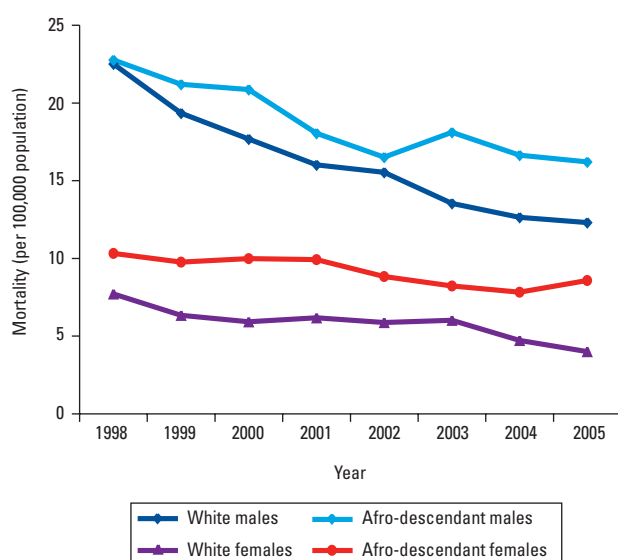
In 2004, Brazil's Special Secretariat for Policies for the Promotion of Racial Equality convened the regional workshop, "Working to Achieve Ethnic Equity in Health," under the auspices of the Office of the United Nations High Commissioner for Human Rights and PAHO. Delegations from 24 countries attended, with representatives from the health ministries, civil society, and the foreign ministries responsible for monitoring summits. Delegates acknowledged that indicators for the Millennium Development Goals for Afro-descendants were lagging (Box 7) and declared that "efforts should redouble to ensure that the Millennium Development Goals benefit the groups that are victims of racism, racial discrimination, xenophobia, and related intolerance" (391).

Although Afro-descendants make up nearly half of Brazil's total population, they account for just 10% of its physicians. The percentage of female doctors of African descent is even lower (Table 31). In Ecuador, the percentage of Afro-descendant physi-

FIGURE 31. Infant mortality rate (per 1,000 live births), by sex, various departments, Bogotá, and national average, Colombia, 2003.



Source: República de Colombia, Ministerio de Protección Social, Instituto Nacional de Salud, Situación de Salud en Colombia. Pan American Health Organization, Basic Indicators, 2003.

FIGURE 32. Risk of dying from AIDS, by sex and ethnicity, trends in the *município* of São Paulo, Brazil, 1998–2005.

Source: Proaim, São Paulo, Brazil, with PAHO collaboration.

cians (1.5%) is much lower than for the population as a whole. In Honduras, of the 17,320 people identified in the census as working in health-related professions, including categories such as midwifery and naturopathy, fewer than 2% (336) were identified as Afro-descendants, which is below the Afro-descendant percentage of the total population (approximately 5%).

To achieve greater equity for ethnic and racial groups in the Region during the “Decade of Human Resources for Health” (2006–2015), efforts by educational institutions to provide training and education with a multicultural focus will be critical, as will those of the health care system to provide updated training to its officials.

FAMILY AND COMMUNITY HEALTH

In order to ensure full access to health care services and change the situations and factors that affect the health of persons and communities, it is necessary to resort to strategies that combine programs, services, and activities and also obtain effective results as a consequence of a conjunction of efforts. One of the proposed approaches relates to family and community health, where families and communities are the key actors in managing health and are not simply relegated to receive comprehensive care and health promoting measures. In summary, the family and community health approach attempts to combine actions and participatory interventions of proven success, that through mutual empowerment increase each one’s effectiveness and allow for access to the health objectives and goals throughout the life cycle

TABLE 31. Percentage of health workers of African descent, by profession and sex, Brazil, 2002.

Profession	Total	Males	Females
Physicians	10	11	8
Oral surgeons	9	11	8
Veterinarians	15	14	16
Pharmacists	8	12	5
First-level nurses and related personnel	20	38	18
Physiotherapists and related personnel	11	12	11
Nutritionists	31	0	32
Total	12	12	12

Source: Household survey, 2001.

(392). For example, reducing infant mortality can become an attainable goal if comprehensive care incorporates the promotion and preservation of health, the prevention of exposure to risk factors, the early detection and restoration of functions impaired by disease, as well as curative and palliative interventions focused on individuals and families.

In Brazil, for example, evidence shows that the family health program has been successful in reducing infant mortality, and it is estimated that a 10% increase in the program’s coverage could reduce infant mortality by 4.5% (393). In theory, significant progress could be made in improving the quality of life of children and reducing child morbidity and mortality rates through a family health program that includes care for pregnant women from the onset of gestation and even earlier, to prevent complications and fetal development problems (394) and the spread of infections in utero; delivery by trained professionals; immunization of newborns and children; the prevention of respiratory infections and treatment of diarrhea and parasitosis; and nutritional guidance, early stimulation, development, and reductions in risks in the home. There also is evidence that shows that programs that stress skill development among fathers and mothers to be able to talk to their teenage children about risks associated with having unprotected sexual relations are highly effective in generating an understanding about the risks and behavior patterns of self-protection (395).

Although it is still necessary to compile information that can conclusively show how integrating programs geared to families can lead to a more efficient use of services and a greater participation by people in the management of their own health, preliminary evidence shows that this strategy is not only advisable, but absolutely necessary for achieving the Millennium Development Goals and expanding the coverage of services. Throughout their lives, individuals maintain associations with their families and communities through various links. Consequently, the use of these social structures is conducive to ensuring an expansion of coverage, as well as an improved efficiency of services and a greater level of participation by families and the community. Similarly, the constant implementation of the actions of the pro-

BOX 7. Reducing the Ethnic and Racial Gap to Meet the Millennium Development Goals

In countries where Afro-descendants make up a large segment of the population, the infant mortality rate must be reduced to meet the Millennium Development Goals with greater equity.

The case of Brazil, where people of African descent make up 46% of the population, illustrates the point. The infant mortality rate in Brazil fell by nearly 40% in one decade, dropping from 49.4 deaths per 1,000 live births in 1990 to 30.8 deaths per 1,000 live births in 2000. In terms of ethnicity, the following table shows that in 2000, the mortality risk for Afro-Brazilian infants was double the risk for infants in the rest of the population.

Infant mortality rate and mortality rate in children under 5, by area and ethnicity, Brazil, 2000.

Ethnic group	Infant mortality rate (per 1,000 live births)			Mortality rate in children under 5 (per 1,000 live births)		
	Total	Urban	Rural	Total	Urban	Rural
Afro-descendant population	37.6	35.1	45.0	46.7	43.3	57.6
Rest of population	25.0	23.3	32.7	29.8	27.5	40.0
Total	30.8			37.6		

Source: Data from Brazil's 2000 Population Census, available from the ECLAC/CELADE database.

To achieve the goal of reducing the infant mortality rate to 16.5 deaths per 1,000 live births by 2015, different strategies for closing the gap between segments of the population should be considered. Under a first scenario, the goal would be met by maintaining the gap at 50%, which would require rates of approximately 19.5 deaths per 1,000 live births among Afro-descendants and 13 deaths per 1,000 live births among the rest of the population. If the infant mortality rate for the general population fell to 16.5, with no drop in the Afro-descendant population, the gap would grow, causing adverse social effects.

Another possible scenario is to attempt to reach the goal while also narrowing the gap. This would require reducing the mortality rate to 18.5 deaths per 1,000 live births for Afro-Brazilian infants, and to 14 deaths per 1,000 live births for the rest of the population. In this case, the goal would be met as in the other scenarios, but with the added value of a 25% reduction in the gap in the infant mortality rate. As illustrated in the table, the same approach could be taken for reducing mortality in children under 5 years old.

The implementation of strategies for achieving these results will require considerable coordination between sectors. For example, the positive impact that maternal education has on infant mortality has already been amply demonstrated. In addition, successful coordination between government programs and the support of civil society will be necessary.

grams and initiatives prevents the neglect and marginalization that can have an impact on persons during critical points in their lives, especially during adolescence and old age. Finally, these kinds of programs encourage older persons to contribute to the well-being of their children and grandchildren (396).

CHILDREN

Infant Mortality and Mortality in Children under 5 Years Old

Approximately 12 million children are born each year in Latin America and the Caribbean. According to estimates, close to

400,000 die before reaching their fifth birthday; 270,000 die before their first year and, of these, 180,000 die during their first month of life (397). This steady loss of life is mainly due to causes that can be prevented, or treated if detected early, such as malnutrition and many infectious and respiratory diseases that together are responsible for one of every four deaths among children under 5 years old. In Latin American countries, the average infant mortality rate dropped from 43 per 1,000 live births to 25 between 1990 and 2003 (398).

Nevertheless, despite this reduction and some progress attained, in many Latin American and Caribbean countries, the high mortality rate among newborns has not dropped as expected. Between 1989 and 1998, the infant mortality rate in Bo-

livia dropped 29%, but during the same period, the neonatal mortality rate in the country only fell by 7% (397).

Low birthweight, asphyxia, and sepsis are responsible for some 40% of the deaths attributed to perineonatal causes, and together are responsible for 80,000 deaths annually. Most of these deaths could have been prevented by improving prenatal care and ensuring adequate care is given during childbirth and for the newborn. A varying percentage of deaths due to problems during pregnancy and childbirth also could be avoided if women reaching childbearing age were in better health (especially in terms of nutrition and being disease-free), received appropriate prenatal care, and qualified care during delivery (399).

Rates of childhood malnutrition in terms of weight-for-age, weight-for-height, and height-for-age have decreased, although high rates of micronutrient deficit persist in countries with the highest infant mortality rates. Low height-for-age reflects chronic malnutrition, the most frequent kind of malnutrition in the Americas, with a regional average of 16% in 2003 (400), although this figure masks disparities in some areas within countries. Low weight-for-age in boys and girls under 5 years old is increasing, on average, by 7% (400). Although information has been published about the benefits of exclusive breast-feeding during the first 6 months of life on infant morbidity and mortality (401), in 21 countries of the Region only 29% of infants benefit from this practice (402).

Poverty and Inequity

Poverty remains as the leading obstacle to achieving good health, adequate development, and quality of life in childhood. In Latin America in 2004, 36.7% of the urban population and 58.1% of the rural was considered poor; 45% lived in extreme poverty, 55% of whom were children (400). Poor families tend to have more children, and they are raised in adverse conditions. In 2000, it was estimated that 36% of all children under 2 years old in Latin America were at high risk in terms of nutrition; in rural areas the percentage rose to 46%, given precarious health conditions and the great difficulties in gaining access to public health services (400).

In 2002, only 69% of Latin America's rural population had access to drinking water and only 44% had access to basic sanitation. Approximately 30% of children under the age of 6 lived in homes without access to drinking water systems and, therefore, were at high health risk associated with the quality of water used for housework and food preparation. In addition, 40% of these children were at high risk for contracting diseases, owing to a lack of systems for excreta disposal and the presence of waste around the home (400).

Integrated Management of Childhood Illnesses

In 1996, the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) designed the Integrated Man-

agement of Childhood Illnesses (IMCI) strategy as a way to help reduce infant mortality and morbidity caused by easily preventable diseases and thus foster healthy growth and development of children under 5 years old, especially among the most vulnerable population groups. IMCI's neonatal component, which targets the first week of life, was recently formulated and is considered crucial to further reduce infant mortality (397). PAHO promotes the implementation of IMCI in the Americas; in 2001, 18 countries, comprising 52% of the population under the age of 5 and accounting for 75% of the deaths that occur annually in this age group, adopted the strategy. The IMCI implementation process consists of the following three fundamental components:

- The *clinical component* aims to enhance the skills of health care workers in managing cases through training, supervision, the provision guidelines for the comprehensive treatment of childhood diseases tailored to local needs, and activities focused on promoting the use of guides for expanding training coverage.
- The *health care systems component* aims to improve the health systems that are necessary for providing good care.
- The *community component* focuses on incorporating family and community practices that are key factors for childhood survival and sound growth and development by enlisting the participation of actors in society and the community.

Through the clinical component, IMCI addresses the evaluation, classification, and treatment of the most frequently seen problems, including aspects dealing with detection, treatment, disease prevention, and health promotion. In this way, IMCI incorporates the treatment of the main reason for the medical consultation and the overall state of health of the child in a comprehensive approach. To this end, IMCI emphasizes the identification of signs and symptoms of other diseases and problems and takes into account the epidemiological profile of each location (403). The community component focuses on community mobilization and participation, based on an analysis of the local circumstances, and enlists the commitment of stakeholders to foster sound health care practices in families and in the community. In other words, it promotes behavior patterns that are essential for preventing disease, improving the physical and mental development of children, providing adequate care in the home, and seeking medical assistance outside the home (404).

IMCI also incorporates a systematic evaluation of children's current state of nutrition, the food they are given, and their immunization schedule. In so doing, nutritional disorders or problems related to diet that can serve to prevent malnutrition or stunted growth can be detected early. Finally, the implementation of the IMCI strategy also encompasses basic child care in the home by strengthening the role of health care personnel in informing and educating parents about how to improve their knowledge and behavioral practices associated with their children's health.

In 2004, a WHO team conducted an in-depth national evaluation of the activities associated with the clinical and community components of the IMCI in Peru. The country was selected because IMCI has broad coverage there, in that every department had received training as part of the strategy (405). In Chao, Peru, the benefits perceived by the society stakeholders and by the mothers consisted of: 1) a better awareness by families of key family practices, and 2) changes in the behavioral practices of families, especially in relation to cleanliness in the home, hand washing, caring for children with diarrhea at home, identifying dangerous warning signs, and seeking medical assistance (406).

Child Development within the Framework of the Millennium Development Goals (MDGs)

The specific goal agreed upon by countries in relation to infant mortality stipulates that by the end of 2015, infant mortality levels would have been reduced by two-thirds of the 1990 figures (MDG 4). The estimates for the Region of the Americas show that achieving this goal will require accelerating the rate of decrease of mortality levels of children under the age of 5, a reduction rate that during the 1990s averaged nearly 2.4% annually. In order to achieve by 2015 a mortality rate that is one-third the earlier figure, the rate of decrease in the mortality levels of children under the age 5 will have to more than double, to 5.6% annually. If this goal were achieved, the number of annual deaths in children under 5 years old would be around 250,000, fewer than half the number that, according to estimates, occurred in 2000 and one-third the number estimated in 1990.

The assessment of the IMCI strategy implementation showed an improvement in the rate of reduction of cases of diarrhea, from 29% annually in 1975 to 50% annually in 2000. In respiratory diseases, the annual reduction in 1975 was 33%, increasing to 50% annually in 2000. This shows that the IMCI strategy has a good potential for reducing the burden from these diseases when it is broadly implemented in national, regional, and international programs (404).

HEALTH AND DEVELOPMENT OF ADOLESCENTS AND YOUTHS

The 2000 Millennium Declaration reaffirmed the commitment to the principles of equality, equity, and human dignity, including as they apply to adolescents and youths. Furthermore, the United Nations General Assembly Special Session on HIV/AIDS (UNGASS) pressed for a reduction in the prevalence of HIV in the population 15–24 years old (2001) (407, 408), while the UN General Assembly Special Session on Children (409) called for the design and implementation of national adolescent health policies and programs (2002). Most countries in the Region of the Americas have already met this latter goal, placing the issue of adolescent and youth health and development on their political agenda.

“The most important new health problem confronting the Americas is the acquired immune deficiency syndrome (AIDS). The number of reported cases in the countries of the Region by the end of December 1987 was 56,368—approximately 74% of the world’s reported cases.”

Carlyle Guerra de Macedo, 1987

Demographic Factors

Young people between the ages of 10 and 24 made up 28% of the total population of Latin America and the Caribbean (161 million individuals) in 2006, with the population 10–19 years old representing 20% (410). Youths 10–24 years old account for a large share of the total population of the Region’s poorest countries, such as Haiti and Nicaragua, where they represent 35% of the general population. Youths account for 30% to 35% of the population of the Dominican Republic, Guatemala, Honduras, and Paraguay, compared with a figure of 23% in Cuba, Puerto Rico, and Uruguay. A breakdown of the population structure of English-speaking Caribbean nations, by country, puts the share of adolescents (young people between 10 and 19 years old) at only 11% in Bermuda, 13% in Aruba, and 24% in the Cayman Islands and Grenada (410).

The growing numbers of young people are putting pressure on education, health, employment, legal, and recreational systems.

Indigenous populations include an even larger share of youths, who make up 24% of the indigenous population of Panama, for example, compared with 18% of the general population. According to data for 2000, the countries with the largest indigenous youth populations as a share of the general population were Bolivia (62%), Guatemala (48%), Ecuador (25%–40%), Belize (16%), Honduras (12%), Suriname (10%), and Guyana (6.3%) (411).

In general, the Region’s youth is the group hardest hit by poverty, as defined by household income level (412). More specifically, 41% of youths between 15 and 29 years of age are living in poverty and 15% are living in extreme poverty (413). More than 50% of youths in Bolivia, Guatemala, Honduras, Nicaragua, Paraguay, and Peru live in poverty. However, there are large disparities between urban and rural areas. Thus, in 2002, one in three youths residing in urban areas was poor, compared with half of all youths in rural areas. Moreover, the likelihood of rural youths being poor is 64% greater than that of youths living in cities around the Region (413).

Adolescent and young women and indigenous youths are among the most vulnerable populations. Females are at a higher risk than males of experiencing a sexual assault or early marriage and/or pregnancy and of dropping out of school (414). Indigenous peoples are one of the poorest and most socially excluded population groups, with 75% to 85% of the indigenous population living in poverty (415), with low levels of education, high

dropout rates, poor-quality jobs, low incomes, poor health and nutrition, and limited access to goods and services (416).

There is more migration by adolescents and young adults (between the ages of 15 and 29) than by children and older adults (413), which heightens this group's health risks in general and their risk of contracting HIV and sexually transmitted infections, in particular. Most migration involves youths between the ages of 17 and 22 (417), who face greater social vulnerability and disadvantages in terms of education, employment, language skills, and legal protection (413). One of the leading forms of migration is rural-to-urban migration. In 2000 in Mexico, for example, 53% of males and 34% of females between 20 and 24 years of age moved to urban areas in search of employment, and 23% of females moved for purposes of marriage or consensual unions. That same year, 73% of residents of rural areas of Brazil between the ages of 15 and 24 moved to an urban area (418).

The rate of international migration by youths between Latin American and Caribbean countries in 2004 was estimated at 17%. There are large concentrations of immigrants in countries such as Argentina, Costa Rica, and Venezuela, consisting mostly of female domestic workers (413). That same year, the rate of out-migration to the United States was 9% in Colombia, 7.7% in the Dominican Republic, 8.8% in El Salvador, and 5.5% in Mexico; the average age of these immigrants was 25.6 (419).

Education

There was progress at all levels of education in Latin American countries in 2001–2005 (412). Most countries have achieved universal primary education coverage and have closed the gender gap. However, only 39.8% of Latin American youths complete their secondary education, compared with 85% of their peers in Organization for Economic Cooperation and Development member countries. The figure is even lower in the Region's poorest countries, at 12%. At higher education levels, only 6.5% of the college-age population graduates, compared with a mere 0.9% in the Region's poorest countries (413).

There are stubborn socioeconomic and rural-urban disparities in the Region. According to data for 2000, 48% of youths in the poorest quintile completed primary school and only 12% of this group completed secondary education, compared with rates of 80% and 58%, respectively, in the richest quintile (420). The dropout rate at the primary education level in rural areas (54%) was double that in urban areas (22%) (413). The indigenous youth population is even more severely affected by these exclusions. In Guatemala, for example, the repeater rate for indigenous students at the primary education level was 90%, while in Bolivia, the probability of a non-Spanish-speaking indigenous child repeating a grade was twice that of a Spanish-speaking child (420). Data for 2001 shows indigenous adolescents in Panama with higher dropout rates and less access to secondary and higher education (421). There is little or no gender gap with re-

spect to access to education, and females reportedly outperform males, particularly in the English-speaking Caribbean countries. Countries like Bolivia, Guatemala, and Peru, however, do not have this same gender equality (407).

Education is a key variable associated with lower pregnancy rates, lower rates of HIV and other sexually transmitted infections, better physical and mental health, and a lower probability of substance abuse, social exclusion, and violence. Improvements in access to and quality of secondary education are crucial for the achievement of positive health outcomes.

Employment

The employment status of the youth population is marked by high job turnover, low pay, and limited social security coverage (412). According to data for 2005, the percentage of the economically active population between the ages of 15 and 19 ranged from 55% in Brazil, to 42.5% in Guatemala, to 14% in Puerto Rico (410), averaging out to 54.2% for the Region as a whole (63.8% for males and 44.5% for females) (422). Since 1995, employment rates for 15-to-19-year-olds have come down by 6.6% in males and edged upwards by 2.2% in females (422).

The unemployment rate for the Region's youth population is 16.6%, 2.8 times higher than the adult rate (422). Of each 100 new employment contracts in the Region's countries, 93 involve adults; the 7 involving youths are mostly for part-time jobs (420). There are clear socioeconomic disparities in employment status, with the Regionwide average unemployment rate for youths in the richest quintile at 8.7%, compared with a rate of 28.1% for youths in the poorest quintile (412). In addition to high unemployment, there are growing numbers of youths in low-paying jobs as street vendors or domestic workers and miscellaneous jobs in the informal sector. More specifically, 69% of working youths between 15 and 19 years of age and 49% of working youths between the ages of 20 and 24 held these types of low-paying jobs (420). According to data for 2000, Haiti had a total of 25,000 female domestic workers, of whom 75% were between the ages of 7 and 14 and 85% were from the countryside (423). An estimated 21% of 15-to-24-year-old poor youths in Latin America and the Caribbean were out of school and out of work (424).

Family Structure and Dynamics

Family structure and dynamics are crucial to healthy adolescent development, and nurturing family relationships can help protect against early sexual initiation, substance abuse, and depression (425). The share of two-parent households in which the mother stayed at home dropped from 46% to 36% between 1990 and 2002, while the share of two-parent households with working mothers rose from 27% to 33% over the same reference period (426). According to data for 2002, 26% of urban households were headed by women. This figure ranged from 21.4% in Mexico and

Ecuador to 35.3% in El Salvador (427). The share of fatherless families with female heads of household increased from 13% to 16% between 1990 and 2002 (426). The percentage of youths living at home with their original families is inversely correlated with their age. In Chile, for example, 98.6% of 15-to-19-year-old adolescents still lived at home with their parents, compared with only 68.4% of youths between 25 and 29 years of age (413). Still, this latter figure suggests a growing trend for children to live at home longer which, in turn, reflects how difficult it is for youths to make it on their own (428).

Youths living in poverty, with little education, and scant employment prospects are at greater risk of having adverse health and development outcomes. They particularly need support that embraces human rights, gender, and equity perspectives.

Mortality and Morbidity

The mortality rate for 15-to-24-year-old youths in the Region in 2003 was approximately 130 per 100,000 population (429). Argentina, Barbados, Bermuda, Canada, Chile, Costa Rica, Cuba, Dominica, Paraguay, the United States, and Uruguay had the lowest rates (<100 per 100,000), while Colombia, Haiti, Honduras, and Peru all had rates of over 200 per 100,000 (429). A breakdown of adolescent and youth mortality rates shows males and youths aged 15 to 24 with comparatively higher rates. The mortality gender gap has widened everywhere, except in Colombia, Cuba, and El Salvador (413).

Table 32 breaks down mortality rates by cause for 15-to-24-year-old males and females in selected countries in the Americas. In or around 2000, so-called “external” causes—including accidents, homicides, suicides, etc.—were the leading cause of death, followed by communicable diseases, noncommunicable diseases, and complications of pregnancy, childbirth, and the puerperium. In Colombia, homicides accounted for 62.5% of male fatalities in this age group, compared with rates of 46.1% in El Salvador, 42.0% in Brazil, and 38.3% in Venezuela (430). During this same period, suicide was the leading cause of death for females in the same age group in Ecuador, El Salvador, and Nicaragua and among the five leading causes of death in another 16 countries.

Complications of pregnancy, childbirth and the puerperium were the main cause of death for 15-to-24-year-old females in Haiti, Honduras, and Paraguay and are still among the five leading causes of death in 18 countries in the Region. In Haiti, complications of pregnancy were the leading cause of death for 15-to-24-year-old females between 2001 and 2003 (429). In the Caribbean, AIDS is already among the five leading causes of death for youths in this age group and, in Jamaica, was one of the three leading causes of death for 15-to-19-year-olds in 2005 (431).

According to morbidity data, obstetric conditions were the most common cause of hospitalization for 10-to-19-year-old females (accounting for 27% and 31%, respectively, of hospital stays in the Caribbean and Central America), followed by trauma

and violence and diseases of the respiratory tract in both males and females. HIV infection was the fourth most common cause of hospitalization in Honduras (430). Tuberculosis is a stubborn problem among 15-to-24-year-olds in the Region, affecting males more than females (432). This age group accounted for 60% of diagnosed cases of tuberculosis in Peru, 40% in Ecuador, 30% in Argentina and Paraguay, and 7% in Uruguay.

Around half of all preventable premature adult deaths are attributable to acquired risk factors dating back to adolescence, such as smoking, poor eating habits, and a lack of physical exercise. Adolescent obesity is on the rise, with a current prevalence rate of between 8% and 22% (433). Half of all obese adolescents continue to suffer from this condition in adulthood. Obese adolescents between the ages of 10 and 15 are at the greatest risk (433, 434). According to data for 2003, 12.7% of females (between 12 and 19 years of age) and 14.6% of their male counterparts in the United States were overweight. The share of overweight adolescents of Latin American descent was as high as 24.7% among females and 19.9% in males (435).

Sexual and Reproductive Health

There are close ties between adolescent sexual and reproductive health and achievement of the Millennium Development Goals (MDGs) (409–412).

Sexual Initiation

Most youths first become sexually active in adolescence, and youths in many countries in the Region are sexually active at an increasingly early age. Over 50% of 15-to-24-year-old females in some Central American countries had had sexual relations by the age of 15 (436); the percentage is even higher in rural areas. In Brazil, according to data for 2006, 36% of young men and women between 15 and 24 years of age reported having been sexually active since the age of 15, and 1 in 5 reported having had sexual intercourse with more than 10 partners during their lifetime (437). In the Dominican Republic, 44% of the female adolescent population had had sexual intercourse before age 15 and 78% had gotten pregnant (438). In Peru, 62% of females who had had sexual relations before the age of 14 were coerced into doing so (407). In Jamaica, 46% of 15-year-old males and 21% of 15-year-old females were sexually active, compared with 90% of 19-to-20-year-old youths (439).

Contraceptive Use

According to a 2002 report by the Economic Commission for Latin America and the Caribbean (ECLAC), nearly 90% of Latin American and Caribbean adolescents were familiar with at least one method of contraception, except in Bolivia (74%), Guatemala (68%), and Paraguay (89%) (416). In the 2004 ECLAC report, 7% of sexually active Honduran females between the ages of 15 and 24 reported having used some form of contraception in their first

TABLE 32. Percentage breakdown of mortality among 15-to-24-year-old youths, by sex and selected broad groups of causes, selected countries, Latin America and the Caribbean, circa 2000.^a

Country	Sex	Noncommunicable diseases				Pregnancy, childbirth, and the puerperium	External causes		
		Communicable diseases		Malignant neoplasms	Diseases of the circulatory system		All	Homicide	Suicide
		All	HIV/AIDS						
Latin America and the Caribbean (14 countries)	Female	13.3	2.9	9.9	9.1	7.9	37.6	9.4	5.7
	Male	6.3	1.9	4.9	3.8	—	76.8	36.3	4.6
	Female	12.8	4.0	13.2	8.8	4.8	41.0	2.7	6.9
Argentina (1997)	Male	6.9	3.2	7.0	5.3	—	72.0	10.2	6.5
	Female	14.6	3.7	8.9	10.6	7.9	37.7	11.2	3.7
Brazil (1998)	Male	6.4	1.9	4.0	4.4	—	78.3	42.0	3.1
	Female	9.1	0.5	18.4	5.5	3.3	39.8	1.9	8.0
Chile (1999)	Male	4.2	1.4	9.6	2.1	—	73.6	6.9	11.3
	Female	9.1	1.4	8.2	7.4	10.0	51.1	20.9	9.5
Colombia (1998)	Male	3.0	0.8	3.0	2.1	—	89.5	62.5	4.2
	Female	5.5	0.0	20.6	9.9	3.2	28.8	9.3	7.0
Costa Rica (2001)	Male	2.4	0.5	9.7	3.2	—	73.0	12.7	8.5
	Female	25.7	14.9	7.3	12.8	6.6	27.4	3.8	2.6
Dominican Republic (1998)	Male	10.7	3.1	3.1	7.0	—	69.7	17.0	2.1
	Female	16.9	0.6	9.8	11.1	8.7	30.0	4.8	7.7
Ecuador (2000)	Male	11.8	1.5	4.9	7.6	—	64.6	24.8	5.8
	Female	10.9	1.6	8.3	8.9	2.1	43.5	10.6	20.0
El Salvador (1999)	Male	7.7	2.4	2.7	3.3	—	75.5	46.1	7.1
	Female	10.0	1.9	12.1	7.2	8.9	31.9	5.8	4.7
Mexico (2000)	Male	6.2	2.5	7.2	3.6	—	69.5	18.1	7.0
	Female	11.5	1.1	6.6	5.6	12.8	41.4	5.5	22.9
Nicaragua (2000)	Male	5.6	0.5	7.6	3.6	—	71.2	17.9	16.8
	Female	24.0	12.0	12.0	1.7	8.8	29.8	2.8	5.6
Panama (2000)	Male	10.0	5.8	5.7	2.1	—	69.8	26.8	6.6
	Female	21.5	2.1	9.4	8.1	6.4	28.8	1.2	3.3
Peru (2000)	Male	18.8	3.8	9.6	5.8	—	45.6	3.2	1.9
	Female	7.2	3.2	15.6	10.4	12.2	42.5	7.2	11.5
Uruguay (2000)	Male	5.4	2.0	6.8	3.4	—	73.9	9.8	19.0
	Female	8.5	1.5	11.3	8.2	7.8	43.5	10.1	4.4
Venezuela (2000)	Male	3.3	1.4	3.3	2.0	—	85.8	38.3	3.9

^aAs a percentage of total deaths.

Source: Pan American Health Organization (PAHO) database, Health Statistics from the Americas, 2003 Edition.

sexual encounter, compared with 7.3% of this same group in Guatemala, 17.8% in El Salvador, and 23.6% in Paraguay (413). According to a Jamaican survey, the rate of contraceptive use by young women in their first sexual encounter rose from 42.7% to 67.3% between 1993 and 2002, while the rate of contraceptive use by male youths went from 21.6% to 43% during the same time frame (440). The same survey found a link between delaying sexual activity until after 18 years of age and a higher likelihood of contraceptive use in the first sexual encounter (77%, compared with 42% for those choosing not to delay sexual initiation) (439). The unmet need for contraception among young women in 2006 was 48% in Honduras, 38% in Guatemala, and 36% in Nicaragua (440–442).

The launching of programs aimed at providing youths with access to contraceptives to reduce the number of unwanted children and prevent deaths due to unsafe abortions should be a priority for the Region's countries.

Pregnancy

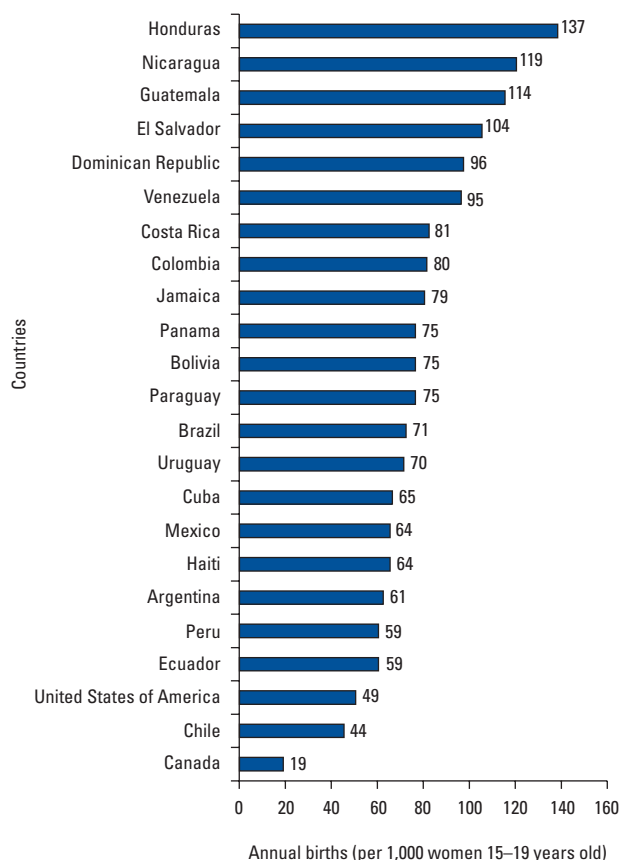
Half the countries in the Americas have adolescent fertility rates higher than 72 per 1,000 live births. Honduras (137), Nicaragua (119), Guatemala (114), El Salvador (104), and the Dominican Republic (96) have the highest rates (440–442). Figure 33 shows fertility rates for 15-to-19-year-old girls for 2000–2005.

According to data for 2001, approximately 33% of young women in Nicaragua between the ages of 20 and 24 had had a child before age 18, and nearly half this group had had a child before the age of 20. The figures for Guatemala and Honduras were 44% and 50%, respectively (440–442).

Adolescents account for 15% of the burden of disease attributable to maternal conditions and 13% of all maternal mortality (443). According to a 2005 study in El Salvador, 52% of maternal deaths involved young women between 15 and 24 years of age (444). Adolescents run a higher risk of adverse pregnancy outcomes such as postpartum hemorrhages, puerperal endometriosis, low-birthweight-for-gestational-age babies, and preterm deliveries. A comparison of mothers under the age of 20 with 20-to-24-year-old mothers shows the former twice as likely to have eclampsia and episiotomies and more likely to have a forceps delivery and to experience postpartum hemorrhaging (445). According to the same study, adolescent girls under the age of 15 were at a four times higher risk of maternal mortality than young women between the ages of 20 and 24 (445, 446).

An estimated 40% of pregnancies are unplanned and a result of no contraceptive use, improper contraceptive use, or contraceptive failure. Available data shows 45% of children born to mothers between the ages of 15 and 19 in Nicaragua to have been unplanned pregnancies (440), compared with figures of 40% in Honduras (441) and 29% in Guatemala (442). These young girls are also less likely to get prenatal care or to have their deliveries attended by a health care professional.

FIGURE 33. Age-specific fertility rate for 15–19-year-old adolescents, selected countries, Region of the Americas, 2000–2005.



Sources:

Corrales G et al. Honduras: encuesta nacional de epidemiología y salud familiar—2001 (ENESF-01, Informe Final). Tegucigalpa, Honduras: ASHONPLAFA; and Atlanta, GA, USA: Centers for Disease Control and Prevention (CDC); 2002.

Blandón LF et al. Encuesta Nicaragüense de demografía y salud 2001 (ENDESA- 01, Informe Final). Managua, Nicaragua: Instituto Nacional de Estadísticas y Censos; 2002.

Stupp P et al. Guatemala: encuesta nacional de salud materno infantil 2002 (ENSMI-2002). Volumen I: Mujeres. Ciudad de Guatemala, Guatemala: Universidad del Valle; 2003.

Monteith RS, Stupp PW, McCracken SD. Reproductive, maternal, and child health in Central America: trends and challenges facing women and children. Atlanta, GA, USA: CDC Division of Reproductive Health and U.S. Agency for International Development (USAID); 2005.

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United Nations, Department of Economic and Social Affairs. World population prospects: the 2004 revision. Accessed 8 February 2007. Available at: <http://esa.un.org/unpp>.

CDC. Knowledge and Outcomes for Young Adults in Jamaica/Gender Differences in Reproductive Health. 2006

UNICEF, UNICEF Statistics. Fertility and Contraceptive Use. Accessed 8 February 2007. Available at: <http://www.childinfo.org/eddb/fertility/dbadol.htm>.

An estimated 1 in 270 women in developing countries undergoing an abortion are at risk of dying, and 15% of all unsafe abortions are performed on 15-to-19-year-old girls and 29% on young women between the ages of 20 and 24. Abortions are responsible for 13% of all pregnancy-related deaths (447).

“All countries have shown declines in infant and childhood mortality and increases in life expectancy at birth, primarily as a result of the control of infectious diseases in the early years of life. As populations have aged and concentrated in large urban areas, chronic and degenerative diseases, particularly cardiovascular disease and cancer, have become more important as causes of morbidity and mortality.”

George A. O. Alleyne, 1995

The prevention of pregnancy in young adolescents is vital for achieving the MDGs and reducing the intergenerational transmission of poverty.

HIV/AIDS and Sexually Transmitted Infections

An estimated 1.6% of Caribbean females (an average of the lowest estimate of 0.9% and the highest estimate of 2.3%) and 0.7% of Caribbean males (low estimate of 0.4%, high estimate of 1.5%) between the ages of 15 and 24 were infected with HIV in 2004. The figures for Latin America were 0.3% (low estimate of 0.2%, high estimate of 0.8%) for females and 0.5% (low estimate of 0.4%, high estimate of 1.5%) for males (437). Adolescent girls between 15 and 19 years of age were six times more likely to be infected with HIV than adolescent males in the same age group in Trinidad and Tobago, compared with a ratio of 2.5 in Jamaica. The AIDS mortality rate for Latin American youths was 2.9 per 100,000 and was the leading cause of death among young women between the ages of 15 and 24 in Belize, Guyana, and Trinidad and Tobago. In general, estimated AIDS mortality rates in Latin America for 2001–2003 were higher for males than for females. However, figures for 15-to-24-year-old females in the Dominican Republic, El Salvador, Paraguay, and Puerto Rico outstripped male rates for the same age group (437).

The increasing feminization and youthfulness of the AIDS epidemic require stepping up AIDS prevention efforts targeted at these population groups.

Sexually transmitted infections affect 1 in 20 adolescents a year. The most common sexually transmitted infections are chlamydia, gonorrhea, syphilis, and trichomoniasis. In pregnant adolescent girls, they increase the risk of delivering premature and low-birthweight infants. Moreover, if left untreated, over the long term, these infections heighten the risk of infertility (accounting for half of all cases of infertility), cancer, and HIV infection (407).

Violence

Africa and Latin America have the world's highest rates of youth violence. There are studies which show that, for every youth homicide, there are anywhere from 20 to 40 victims of attempted homicides in this same age group requiring hospital

care (448). In Colombia and Peru, 6 out of 10 adolescents report having suffered psychological and physical abuse in the home (449). Colombia's 2005 National Population and Health Survey found 44% of women reporting an incident of physical abuse by their spouse to be between the ages of 15 and 29. In Central America, between 3% (Honduras) and 10% (Costa Rica) of male respondents between the ages of 15 and 44 reported having been sexually abused, with the abuse occurring between the ages of 10 and 13 in 30% to 46% of these cases (450). Another cause of violence is gang activity. The current number of gang members in Central America is estimated at somewhere between 30,000 and 285,000, mostly in El Salvador, Guatemala, and Honduras, with another estimated 50,000 gang sympathizers counted among area youths (451).

Substance Abuse

A survey of seven countries in the Region by the Inter-American Drug Abuse Control Commission, an agency of the Organization of American States (CICAD-OAS), found that approximately 10% of 13-to-17-year-old adolescents in school had used illegal drugs sometime in their lives (452). Rates of reported drug use in the month immediately prior to the survey ranged from 1% in El Salvador and the Dominican Republic, to 4% in Uruguay, and 8% in Paraguay (452). Approximately 40% of the students surveyed indicated that it was easy to get hold of drugs in their country, and one in four reported having been offered some type of illegal drug at some point (452). Dependency rates for marijuana and inhalants among Brazilian adolescents were 6.9% and 5.8%, respectively (433).

Rates of tobacco use by 13-to-18-year-old adolescent male and female respondents in the month immediately prior to the survey ranged from 9.7% for Venezuelan males to 37.0% for Uruguayan females (452). Rates of exposure to tobacco advertising for 14-to-17-year-old adolescents in Latin American and Caribbean countries run extremely high, exceeding 90% in Argentina, Bolivia, Costa Rica, Mexico, and Uruguay. In Uruguay, 35% of male and female students between the ages of 11 and 15 reported having already tried their first cigarette, and 21.6% of adolescents had received a free offer of cigarettes from some tobacco company sometime between 1999 and 2001. In Argentina, 35% of 12-to-15-year-old adolescents reported having used tobacco in the last 30 days. Argentina has the world's highest percentage of adolescents exposed to tobacco smoke in public places (at 86.7%). Ironically, 70.4% of adolescents in Argentina feel that smoking should be banned in public places, which is almost the exact number of adolescent non-smokers in that country (433).

According to a number of studies, alcohol consumption is on the rise in Brazil, Chile, Costa Rica, and Mexico, particularly among young women (433). A study of adolescent health in the Caribbean found 40% of females and 50% of males between the ages of 12 and 18 to have consumed alcohol and 1 in 10 youths

between the ages of 16 and 18 to have consumed four or more alcoholic drinks at a time. In Brazil, 25% of 6-to-18-year-olds spending all day on the street used alcohol regularly (433).

PAHO is helping the Region's countries strengthen adolescent health and development through a child development, rights, gender, and equity-based approach. Given the links between different types of high-risk behavior, the Organization is recommending use of the so-called Integrated Management of Adolescent Needs (IMAN) strategy, which coordinates country efforts in the area of primary health care, mainly at the first level of care, focusing on the health sector, with cross-sector integration.

The IMAN strategy is designed to consolidate health promotion, prevention, and treatment efforts through the following components: 1) assistance in improving information systems for gathering disaggregated data by age group (10–14, 15–19, and 20–24), gender, and ethnic origin; 2) assistance in framing youth policies, including health policies; and 3) in-country cooperation for the delivery of high-quality services with universal service coverage for adolescents and youths. It also helps train necessary human resources for addressing prevailing health needs and problems. The family and community-based component is geared to promoting interventions for strengthening the families of adolescent girls, addressing gender issues by empowering adolescents and developing a more equitable social construct of masculinity, and coordinating youth involvement. Strategic alliances with organizations such as the United Nations, the Swedish International Development Agency, and the Norwegian International Development Agency have optimized the effort's effect. There are still many challenges, such as improving program monitoring and evaluation capacity at the country level, mounting evidence-based interventions, generating data in key areas, and mobilizing necessary resources at the country and regional levels.

The inter-program initiative for the promotion of child development and violence prevention mounted by PAHO and the German Technical Cooperation Agency with funding from the German Government is a good example of this kind of partnership. It has produced hard data on the subject, has organized classroom and online distance training courses, has helped establish a conceptual framework, and has strengthened the monitoring of results and evaluation systems.

OLDER ADULTS

The aging of the population varies a great deal from subregion to subregion in the Americas. In Bolivia, for example, there are 17 persons 60 years old and older for every 100 adolescents under 15 years old, while in Uruguay, there are 70 older persons for every 100 children, and in Canada, there are 88 for every 100. With the exception of Bolivia, Haiti, Guatemala, Honduras, and Nicaragua, every country of the Region will have at least as many or more persons aged 60 than children under the age of 15 by the middle

of the 21st century. In Cuba, Barbados, and Puerto Rico, there will be 200 older persons for every 100 adolescents under the age of 15 (453).

In the last 25 years, life expectancy at birth in the Americas has increased by 7 years, and the current average exceeds 70 years of age, with a seven-year difference in averages between figures for North America and those for Latin America and the Caribbean. Of Latin American and Caribbean persons born today, 78.6% are expected to live beyond age 60, and 4 of every 10 will live beyond 80 years. On average, older adults in the Region are living increasingly longer lives: while in the 1950s they lived 9.9 additional years after age 60, the data for 2006 shows that today they live an average of 20.5 years after age 60 and 7.1 years after age 80.

A Decrease in Premature Deaths before Age 85

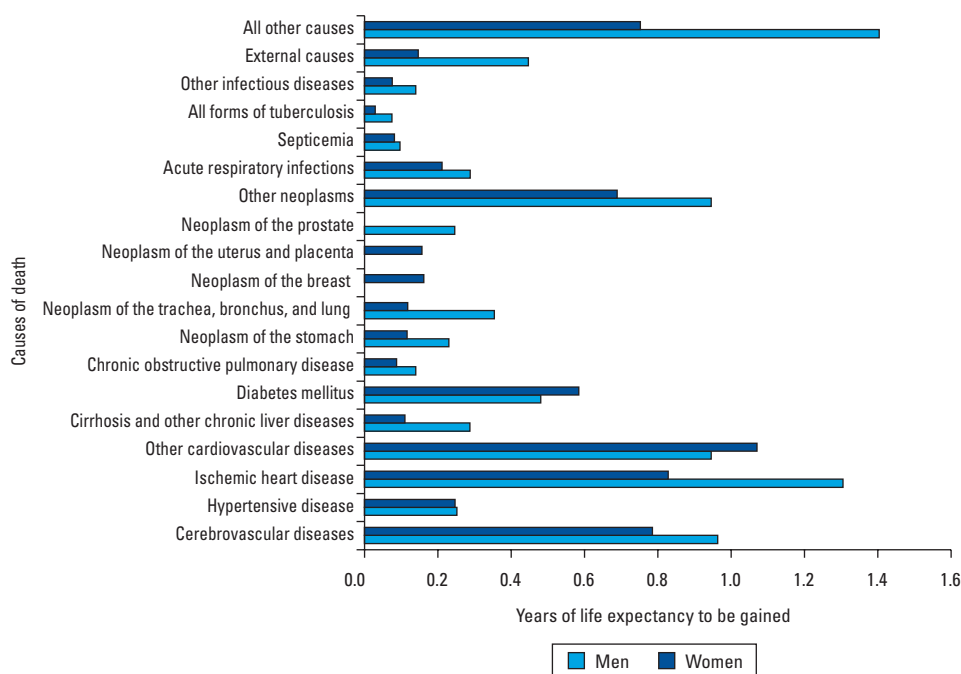
Increases in longevity beginning in the 1940s mainly have been due to reductions in the number of cases of infectious diseases and to success in reducing mortality rates during infancy and other early life stages. Since the 1980s, the absolute risk of dying has dropped by 10% among those aged 60 and older; as a result, the life expectancy at age 60 increased an average of 1.5 years.

An analysis of the burden of mortality on the population older than 60 years old to determine the gap between ages 60 and 85 (years of life lost or years of life to be gained) since the 1980s showed that there are still between six and nine years of life that can be potentially gained by reducing mortality at these ages (Figure 34). Therefore, an important challenge for the public health sector is to reduce the difference between life expectancy observed at the beginning of the 21st century in persons 60 years old and older, and a theoretical projected life expectancy of 85 years (454).

The standardized mortality rates from specific causes and their contribution to potential years of life lost (PYLL) underscore the priorities for improving life expectancy in the Region. Between the 1980s and the 1990s, mortality rates from infectious diseases dropped 16% among men and 19% among women age 60 and older. The risk of dying from these causes currently contributes 0.5 PYLL, with respiratory infections being responsible for half. There was, for example, a reduction in the number of deaths from tuberculosis by more than 50%. The standardized mortality rate attributed to malignant neoplasms increased slightly among men (4%) and dropped among women (5%), with an increase in mortality from prostate cancer of 52% among men and of cancer of the lung (25%), stomach (34%), breast (15%), and uterus (14%) among women.

Malignant neoplasms contributed to a 1.7-year loss in life expectancy among men and 1.2 years among women older than 60. In addition, there was a drop in the risk of dying from cardiovascular diseases of 21% in men and 29% in women, despite the fact that these diseases continue to be among the leading causes contributing to PYLL among the population 60 years and older: 3.5

FIGURE 34. Years of life expectancy to be gained up to age 85 years in the population 60 years old and older, by cause of death, Latin America and the Caribbean, beginning of the 1980s to end of the 1990s.



Source: Pan American Health Organization, Washington, D.C. Mortality burden in adults (DPM/GPP/Pg and AD/THS/MH), 2003.

years among men and 2.9 among women, with a greater specific weight of deaths associated with ischemic heart disease. There also was a drop in the risk of dying from external causes (women, 19% and men, 16%). It is worth mentioning that suicide is six times more prevalent among older men than among women in the Region. The risk of dying from other causes increased, and underscores an increase in mortality rates attributed to diabetes mellitus of 57% in men and 38% in women. Among the latter, this disease is a greater contributor to PYLL (0.58) than all of the negative inputs from infectious (0.39) and external causes (0.14) together; in men, diabetes contributes to 0.48 PYLL.

With an increasingly aging population in Latin America and the Caribbean, older persons' mortality burden also grows in weight and relevance, given changes in the risk profiles of falling ill and dying, the real or potential impact of mortality on life expectancy, and inequities in the quality and access to health care services. The efficacy of health policies and the performance levels of health care systems targeted to the older population should be evaluated based on assigning priority to reducing premature death, and the effectiveness of actions aimed at increasing the number of years of life without disability after age 60.

Increasing Health and Functionality in Years Gained

Four population studies have been conducted in Latin America and the Caribbean on the health and welfare of older persons:

the Health, Well-being, and Aging Survey conducted in seven Latin American and Caribbean cities (SABE, 2000) (455); the National Study on Health and Aging of Mexico (ENASEM, 2001 and 2003) (456); the survey on the Health Conditions of Older Persons in Puerto Rico (PREHCO, 2004–2006) (457); and the Study of Longevity and Healthy Aging in Costa Rica (CRELES, 2004–2008) (458). In the United States (459) and Canada (460) longitudinal and representative population studies have been conducted, which facilitate the study of health patterns among the older population and help to systematically assess policies and programs. The results of these studies have served to enhance the understanding of the health situation and the epidemiological features of the older population, mainly in the Region's urban areas and more developed countries. Nevertheless, there is a need to conduct studies that will measure the health and well-being of older populations living in rural areas, as well as of older indigenous adults, in order to identify inequalities in health among the Americas' diverse groups.

In all the available studies, a majority of older adults indicated they had been diagnosed with hypertension (48.7% in selected Latin American and Caribbean cities; 56.7% in Puerto Rico; 37.2% in Mexico; 51.9% in the United States; and 32% in Canada). In the SABE survey, only 61.3% of persons diagnosed with hypertension reported that they had received outpatient services in the 12 months immediately prior to the survey; 72.2% took some medication for hypertension, but one of every two had to pay all

or partial costs; 65% reported they were not in good health; and 20.6% exhibited symptoms of depression. In addition, one out of five persons with hypertension reported suffering from at least two chronic ailments.

The prevalence of diabetes mellitus is increasing worldwide. In the PREHCO study, the prevalence rate among persons aged 60 years and older in Puerto Rico was 28%, a rate similar to that in Mexico City and in Bridgetown, Barbados, where 22% reported having been diagnosed with diabetes mellitus. The prevalence rates of diabetes found in the SABE studies and in the PREHCO study underestimate the actual prevalence of the disease, in that it entails diagnoses carried out by medical and nursing staff. In Mexico City, the SABE survey conducted there reported that the prevalence of diabetes doubled when the interviewer also conducted a fasting glucose test of all those questioned in the survey. It is well known that diabetes complications can be serious, and that proper care in dealing with the disease is vital. Diabetes also is known as one of the main causes of blindness among older persons. It is alarming to note that among persons aged 60 to 74 that reported that they suffered from diabetes in the SABE and PREHCO surveys, at least 60% and 58%, respectively, also reported that they had vision problems, both with and without glasses; 20% in the SABE survey and 16% in the PREHCO survey reported having difficulty performing at least one basic activity in their daily lives.

The predominant risk factor associated with living with disabilities in old age is being female. In the SABE survey, three out of every four women reported suffering from at least one of three disabling conditions: arthritis, incontinence, and poor vision (this last factor contributes to falls, hip fractures, and depression among older persons). And yet, most elderly persons cannot afford to pay for ophthalmologic treatments. Chronic pain due to arthritis and isolation due to urinary incontinence contribute to inactivity and the loss of functions in this age group, although there is evidence showing that the proper management of these chronic afflictions leads to improved health and increases the number of years of life free from disability. Nevertheless, most older persons in Latin America and the Caribbean do not have access to treatment needed to deal with their chronic ailments, either because of a lack of skilled personnel in geriatrics or a lack of access to medicines.

Regional Strategy for the Implementation of the Madrid International Action Plan on Aging

The adoption of the Madrid International Action Plan on Aging (PAIME) (461), in April 2002, represents a historic marker in addressing the demographics of aging worldwide. Subsequently, in November 2003, the Economic Commission for Latin America and the Caribbean (ECLAC), together with the other organizations of the Inter-Agency Group on Aging—the United Nations Population Fund, PAHO, the International Labor Organization, the Inter-American Development Bank, the World Bank,

and the United Nations Program on Aging—held a Regional intergovernmental conference on aging in which the implementation of the PAIME strategy for Latin America and the Caribbean was agreed upon. The Region's countries agreed to establish, tailored to their particular circumstances, specific goals for completing the Regional strategy objectives and follow-up mechanisms to assess national goals. In 2004–2005 three intergovernmental sub-regional meetings were held to promote the development of national goals.

The process of establishing national goals and determining follow-up mechanisms has been extremely difficult and is not yet completed. If any significant progress was made, it was when the Region's countries identified a focal point to follow up on the PAIME commitments, although only 8 of 20 countries in Latin America and 2 of 22 countries and territories in the Caribbean have created national multisectoral committees charged with establishing goals for three of the PAIME priority areas: 1) older persons and development, 2) promoting health and well-being among the elderly, and 3) creating a conducive and favorable environment.

Regional Commitment to Promote Health and Welfare among the Elderly

According to PAIME, older persons should have access to comprehensive health care that is appropriate to their needs, that ensures a better quality of life in their old age, and that preserves their functionality and autonomy. To this end, the Regional strategy has set out four objectives (462):

1. Promote universal health service coverage of older persons and incorporate aging as an essential component of national health legislation and policies.
2. Establish a comprehensive health plan that responds to the needs of older adults, reinforcing and reorienting existing services and creating new ones that are needed.
3. Promote healthy behaviors and environments by formulating legislation, policies, programs, and actions at the national and community levels.
4. Create appropriate legal frameworks and mechanisms to protect the rights of older persons who use long-term care services.

In regard to the first two objectives, social protection related to the health of older persons in Latin America and the Caribbean is carried out through three systems: a free-access public system, a social security system that includes enrollee contributions and government subsidies, and private insurance plans. No country in the Region specifically guarantees a comprehensive health care plan for older persons. In most health benefit systems there are no evidence-based standards or protocols dealing with care provided for chronic and age-related diseases and specifically designed for older persons. In terms of objective 3 despite WHO's

global dissemination of the “active aging” concept (463), the countries that have developed national health promotion plans have left out specific goals for changing behavior patterns of persons 60 years old and older. In response to objective 4, countries have made significant advances in developing legal frameworks to protect the rights of older persons, although no programs or protocols have been developed to monitor the rights of those using long-term care services.

Technical Cooperation Strategies

PAHO promotes the following strategies for improving access and quality of health services provided to older persons:

1. Develop, define, and promote preventive medicine and specific disease management strategies for older persons as part of the effort to strengthen primary health care in all of the countries of the Region.
2. Establish, in cooperation with the Region's countries, quality and access to health service indicators that can measure progress in the Regional strategy for implementing PAIME.
3. Cooperate with human resource training programs and with the Latin American Academy of Medicine for Older Adults (ALMA) to implement training programs for health care personnel and in managing the health of older persons.
4. Develop standards and follow-up protocols to protect the human rights of persons who use long-term care services.

PERSONS WITH DISABILITIES

Analyzing the conditions of persons with disabilities in the Region is a difficult and complex endeavor, given such factors as the scattered nature of the data, a lack of standardized technical language that can articulate the issue's various aspects, and a lack of an intersectoral approach. Providing care to people with disabilities is one of the greatest challenges for the health sector and for society in general in the 21st century. This care must be able to prevent disability and provide rehabilitation; improve the quality of life and foster independence of people with disabilities; and promote the integration and inclusion in society of persons with disabilities under conditions of equal opportunity and respect for their rights and dignity. To achieve this, efforts must be pursued within an intersectoral and interdisciplinary framework and with the community's active participation (464). The *International Classification of Functioning, Disability, and Health* states that disability (465):

[...] is a generic term that includes impairments in body functions and structures, activity limitations (capacity) and participation restrictions (performance). It indicates the negative aspects of the interaction between an individual (with a “health condition”) and his context (environmental and per-

sonal factors). In this approach, disability is the result of the interaction between a person's functioning and environment, always related to a health condition.

Disability is a multidimensional, multifactor phenomenon in which poverty plays an important role because of its ability to generate or perpetuate disabilities. In the Americas, the prevalence rate of disability varies considerably, given the wide range of methods used to measure it and a lack of standardization and harmonization in the technical criteria used to define it. To assess the magnitude of the problem, several countries have used population censuses conducted around 2000. Data revealed widely varying rates: 14.4% in Brazil; 5.3% in Costa Rica; 6.4% in Colombia; 4.7% in the Dominican Republic; 2.6% in Honduras; 1.8% in Mexico and Panama; 1.1% in Paraguay; and 3.9% in Venezuela. In most cases, these percentages reflect only the most serious or permanent disabilities. Other countries have used specific surveys on prevalence, as has Argentina, or household surveys, as has Uruguay, which had prevalence rates of 7.1% and 7.6%, respectively.

Relying on the *International Classification of Functioning, Disability, and Health* (ICF), national studies were conducted between 2003 and 2005 in Chile, Ecuador, Nicaragua, and Panama, and, more recently, in Colombia, using the disability module of the Population Census (466, 467) (Table 33). Some of the survey results are described below.

Nicaragua recorded a disability prevalence rate of 10.3%, with women accounting for 56% of the total, and urban dwellers accounting for 60%. The age group that was most affected were persons 20–59 years old, who accounted for 47% of the total. Of persons with disabilities, 45% had never attended school. The most common disabilities were associated with mobility, communication, and participation in society, and the most commonly identified causes included age-related degenerative disorders, chronic disease, accidents of all kinds, complications related to pregnancy and childbirth, and work-related diseases (468).

In Chile, the national prevalence rate, based on the ICF, was 12.9%, with 2.5% of the population suffering a serious disability. Women accounted for 58.2% of the total population of persons with disabilities, and urban dwellers accounted for 83.3%. The most affected age group were persons 30–64 years old (51%). The prevalence rate was twice as high in the low-income population, where one in two people with a disability had not completed basic education. The most common impairments were physical (structures and functions related to movement, neuromusculoskeletal functions), accounting for 31.2% of the total, followed by visual impairments (18.9%) and bodily function impairments (13.9%). All created problems related to activity, such as seeing, moving, hearing, and personal care. The survey found that the main causes of disability were chronic disease, age-related degenerative problems, accidents of all kinds, and newborns' complications related to pregnancy and childbirth (469).

TABLE 33. Disability prevalence (%), by data source, selected countries, Latin America, 2000–2006.

Country	Census ^a (2000)	Household surveys (2003)	Prevalence studies (using ICF) (2002–2006)	Others
Argentina			7.1 ^d	
Brazil	14.4			
Chile	2.2	5.3	12.9	
Colombia ^c	6.4			
Costa Rica	5.3			
Cuba ^b				3.2
Dominican Republic ^a	4.7			
Ecuador	4.6		12.1	
El Salvador		1.5		
Honduras	2.6			
Mexico	1.8			
Nicaragua			10.3	
Panama	1.8		11.6	
Paraguay	1.1			
Uruguay ^c		7.6		
Venezuela	3.9			

^aModerate or severe impairment.^bSevere impairment, excluding mental problems.^cUsed ICF (International Classification of Functioning, Disability, and Health) as a technical basis.^dNo ICF.**Source:** Technical document CD47715, Disability: Prevention and Rehabilitation in the Context of the Right to the Enjoyment of the Highest Attainable Standard of Health and Other Related Rights.

In Ecuador, the national disability prevalence rate, based on the ICF, was 12.1%, with women accounting for 50.3% of the total and persons 20–64 years old accounting for 51%. In the survey, 80% of respondents reported the cause of their disability as related to a health condition. The remainder indicated that their disabilities were the result of accidents or other causes. In all, 56% of people with disabilities were unemployed, and the main impairments noted were related to mobility, learning, communication, and interaction with others (470).

In Panama, the prevalence rate was 11.6%, with women accounting for 52.4% of the total, and men, 47.6%. The survey found that 77.6% of people with disabilities did not work, and only one in ten attended school. The most common impairments were multiple impairments (23.5%), followed by motor (23.8%), visual (15.7%), and mental (13.3%) impairments (471).

Data from the 2005 census in Colombia, which used the ICF, indicate that, of the total number of people identified as having a permanent impairment, 71.2% had just one impairment, 14.5% had two, 5.7% had three, and 8.7% had four or more. Of the total number of people reporting some type of disability, 29% had impairments in moving or walking; 14.6% had impairments in the use of arms and hands; 43.2% had visual impairments, even with corrective lenses; 17.3% had hearing impairments, even with hearing aids; 12.8% had speaking impairments; 11.9% had learning or comprehension impairments; 9.9% had problems relating to others, due to mental or emotional problems; 9.4% had diffi-

culty bathing, dressing, or feeding themselves; and 19.4% had some other limitation (472).

All the studies provided extremely important data for assessing the situation of people with disabilities in Latin America and the Caribbean: 25% are children and adolescents; between 2% and 3% have access to rehabilitation programs and services; half of all people with injuries from traffic accidents are young people between 15 and 34 years of age; the population with disabilities older than 65 represents a high percentage of the total population with disabilities; 50% of people with disabilities in the Region are working age; between 2% and 3% of newborns have serious disabilities; and between 6% and 8% of children (2–6 years of age) have a high risk of disability. Of children with disabilities between the ages of 2 and 12, between 20% and 30% attend school, but only 5% complete their primary education; they suffer more discrimination, violence, and mistreatment than other children and are often confined to institutions (467, 468).

Access to the health care system, and particularly to rehabilitation services, for persons with disabilities continues to be a problem, as does inequality in the provision of these services. For example, in Chile, 1 in 15 people with disabilities used rehabilitation services in 2004, but people living in urban areas had better access than their rural counterparts. An analysis of the data from Chile's study reveals that 1 in 9 people with disabilities in high-income groups had received rehabilitation services, compared to 1 in 20 persons in low-income groups. Of the latter group, 9 of 10

BOX 8. Strategic Guidelines for Technical Cooperation in the Field of Rehabilitation and Participating Countries, Region of the Americas

Guideline	Countries
Early detection of disability in children 0–6 years old in the primary care network.	Argentina, Cuba, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, and Venezuela.
Community-based rehabilitation incorporated into the health care system.	Argentina, Bolivia, Colombia, El Salvador, Guatemala, Guyana, Honduras, Nicaragua, Panama, Paraguay, Peru, and Venezuela.
Strengthening of rehabilitation activities at the intermediate- and high-complexity levels.	Argentina, Chile, Costa Rica, Cuba, El Salvador, Guatemala, Honduras, Nicaragua, Panama, Peru, and Venezuela.
Conduct of disability prevalence studies.	Chile, Colombia, Nicaragua, and Panama.
Uses and applications of the International Classification of Functioning, Disability, and Health (ICF). Analysis of the situation of people with disabilities.	Argentina, Chile, Costa Rica, Cuba, Dominican Republic, El Salvador, Nicaragua, Panama, Paraguay, and Venezuela.
Epidemiological surveillance of disability.	Argentina, Chile, Colombia, Mexico, Peru, and Venezuela.
Safe access to the physical environment and information.	Argentina, Cuba, Dominican Republic, Guatemala, Honduras, Mexico, Nicaragua, Panama, and Venezuela.

Source: Technical Document CD47715, Disability: Prevention and Rehabilitation in the Context of the Right to the Enjoyment of the Highest Attainable Standard of Health and Other Related Rights.

people were seen in public facilities, whereas 3 of 4 people in high-income groups were treated in private facilities (469).

In Nicaragua, 60% of people with disabilities in urban areas received health care, compared to 48% in rural areas. Of the total population with disabilities, 87% reported having at least one unmet basic need in the area of health care; 43% lacked prescription medication; 20% were in need of auxiliary aids; and 18% were in need of specialized services. As of 2003, 56% of Nicaraguans with disabilities had used a health care service and 2% had attended a rehabilitation center (468).

In Panama, 1 in 8 people with disabilities used rehabilitation services in 2005 (471), and in Argentina, 60.3% of the population with disabilities had health-care coverage through a government, private, or mutual plan. However, public and private plans did not always cover rehabilitation treatment (473, 474). Overall, there are inequalities in the care people with disabilities receive through the Region's health care systems. Furthermore, the health care systems do not make sustained, systematic efforts to prevent disability or reduce risk factors; provide care for all types of disabilities; develop rehabilitation services by degree of complexity; or meet the needs of the population with disabilities. Health and access to disability-related services is now considered to be a

human right and, as such, society should approach the issue from an intersectoral perspective (475). To this end, in 2001–2005, PAHO established a series of strategic guidelines for technical cooperation with the Region's countries in the field of rehabilitation (Box 8).

In conclusion, the multiple causes of disability and the complexity of the factors that interact to produce disabilities compel us to search for and identify approaches and strategies that will facilitate an integrated response, through programs and public policies that respond to the needs of people with disabilities and promote their rehabilitation and social integration.

NEW PUBLIC HEALTH CHALLENGES

NEGLECTED DISEASES IN LATIN AMERICA AND THE CARIBBEAN

The Problem

More than 209 million persons in Latin America and the Caribbean live below the poverty line (476), and they bear the burden of several infectious parasitic diseases. PAHO has grouped

BOX 9. List of Common Neglected Diseases in Latin America and the Caribbean

Common in shantytowns and slums:

- Lymphatic filariasis (elephantiasis).
- Leptospirosis (Weil's disease).

Common in rural and agricultural areas of several countries:

- Schistosomiasis (snail fever or blood fluke).
- Fascioliasis.
- Leishmaniasis (cutaneous and visceral).
- Chagas' disease (American trypanosomiasis).
- Cysticercosis and trichinosis.
- Plague.

Common in some indigenous communities:

- Onchocerciasis (river blindness).
- Parasitic skin diseases (scabies, sandfleas, and tinea fungal mycoses).

Common in most impoverished populations:

- Roundworms, hookworms, and whipworms (soil-transmitted helminths).

Source: PAHO/HDM/CD/P 2006.

some of these diseases under the category of “neglected diseases of neglected populations,” and they require urgent attention because of their extraordinary contribution to poverty, malnutrition, interrupted schooling, and reduced employment opportunities. Neglected diseases result from the interactions between biological determinants of health, ecosystems, and human social systems, which have come to be out of balance because of poverty and environmental degradation. Neglected diseases are termed as such because they are continually overlooked for health and development funding and are not subject to regular reporting. Funding is more heavily focused on HIV/AIDS, tuberculosis, and malaria, which have higher mortality rates in comparison to neglected diseases. However, neglected diseases cause the suffering of millions, and are responsible for high rates of morbidity and drastic reductions in income for the most marginalized and poverty-stricken members of communities. Where neglected diseases overlap geographically, they often produce a high cumulative disease burden, since many individuals and communities are infected with more than one type of parasite simultaneously (coinfections).

Many persons affected by neglected diseases are indigenous peoples, minority ethnic groups, marginalized urban populations living in shantytowns and slums, isolated rural populations, or seasonal migrant workers. This makes addressing neglected diseases a question of human rights and equity, as well as a significant public health issue (see Box 9). Certain neglected diseases also carry with them much stigmatization in that they

involve physical deformities or disabilities, further marginalizing affected individuals. As a result, the issue of neglected diseases in neglected populations is emerging as an important one and one that needs to be supported and tackled as a part of the current global debate on health inequalities and burden of disease. Neglected diseases also impede countries from reaching the health objectives of United Nations Millennium Development Goals.

Neglected Diseases in Neglected Populations

Neglected diseases such as intestinal helminthiasis disproportionately affect the poor, particularly poor children, cause anemia, and adversely affect children's growth and development, which contributes significantly to cognitive problems (learning), school absenteeism, and poor scholastic performance. Ultimately, they lead to overall poor health status and a poor quality of life, thus making it difficult for future generations to escape the cycle of poverty.

Disease Burden

Neglected diseases can cause high rates of morbidity among those infected, although mortality rates associated with their infection are often low. Soil-transmitted helminths, an important group of neglected diseases, are widespread throughout the Region; PAHO and WHO estimate that 20%–30% of persons living

in the Americas are infected with one of several helminthiases (477). Intestinal helminth infections in slums can often reach 50%; they can reach up to 95% in some indigenous tribes (478). These infections are known to lower the work capacity of adults (479, 480) and are among the main causes of anemia among women of childbearing age (481, 482). Schistosomiasis, another helminth infection transmitted by water contact, occurs in seven of the Region's countries, mostly in small geographic foci and at low prevalence (483). This suggests that the elimination of this disease from some foci is possible, such as those in the Caribbean.

Other neglected diseases such as lymphatic filariasis (elephantiasis), leprosy, and Chagas' disease also cause severe chronic disease or debilitation if not treated, are often accompanied by prejudice and stigma, and prevent adults from assuming their full economic and social potential in the workplace, in the home, and in society. Leishmaniasis and onchocerciasis are two neglected diseases that cause disfiguring skin lesions, and, in the case of onchocerciasis, infection can lead to blindness.

Despite the enormous cumulative toll that neglected diseases have on the health and productivity of marginalized populations, many of them can be effectively controlled or even eliminated through large-scale preventive chemotherapy and health-promotion activities such as school-based health education campaigns and community efforts that promote healthy behaviors and teach people how to avoid certain risks. These should be coupled with the provision of clean household water, street drainage, and basic sanitation systems. Certain neglected diseases cost only pennies to treat with medicines; in the case of schistosomiasis and intestinal helminths, US\$ 1 will buy one annual treatment for 5 and 50 infected children, respectively.

PAHO's strategy to combat neglected diseases takes a holistic approach to disease prevention, treatment, and elimination that recognizes the range of social, economic, and environmental factors that influence health and well-being. PAHO is developing an intersectoral and integrated approach to neglected diseases that is expected to have a positive effect in the battle against neglected diseases, and to be cost-effective; it will need demonstration and testing in the field, however. This approach takes advantage of the geographic overlap of some neglected diseases, their common risk and protective factors, and the presence of local-level disease prevention and control programs. PAHO's approach provides innovative and cost-effective opportunities for one disease control intervention as it is combined with another (i.e., "piggy-backing"). An example includes using combined therapies to control soil-transmitted helminths and schistosomiasis by jointly administering albendazole and praziquantel in the same interval. Another involves taking advantage of synergies by packaging together deworming, vitamin A supplementation, and childhood immunization.

PAHO's neglected disease strategy goes beyond these opportunities for improved service delivery by the health sector. The strategy involves local community- and family-focused activities

with other sectors, utilizing field-tested, development-based interventions that have proven to be successful. The combination of integration, intersectoral partnering, and interprogrammatic approaches to health is emerging as an increasingly important strategy in the face of current development trends, which include a decline in international development funding and the growing interest in corporate responsibility towards social issues. In the future, the fight against neglected diseases will seek to take full advantage of the synergies and efficiencies created by these approaches.

Leishmaniasis

Leishmaniasis is a group of parasitic diseases distributed worldwide and transmitted to humans by the bite of approximately 30 species of sandfleas infected by protozoa of the genus *Leishmania*. It is estimated that two million new cases occur every year throughout the world, of which 1.5 million cases are cutaneous leishmaniasis. There are more than 12 million persons estimated to be infected. Official data underestimate the reality of the human affliction by these protozoa, because much of the official data is obtained exclusively through passive detection; there are many undiagnosed cases; many persons are asymptomatic; and only 32 of the 88 countries where the disease is endemic require compulsory reporting. With the exception of Chile and Uruguay, cases in the Americas have been reported from northern Argentina to southern Texas. Based on 2005 data on cutaneous leishmaniasis, the countries reporting the greatest number of cases were Bolivia, Brazil, Colombia, Ecuador, Panama, Paraguay, Peru, and Venezuela. Brazil had the most cases of visceral leishmaniasis.

The leading factors that contribute to leishmaniasis morbidity are inaccessibility to patient care, limited or no organized social participation, insufficient use of information in decision-making, lack of treatment, and human interaction with the vector.

With support from PAHO and Brazil's Ministry of Health, in November 2005, a meeting of experts was convened in Brasilia to discuss ways to strengthen systems for the prevention of visceral leishmaniasis in the countries of the Americas. The experts mainly concluded that leishmaniasis in all forms is an important disease in the Region, and that the incidence of visceral leishmaniasis has increased in recent years. They also concluded that surveillance systems are insufficient and there are no human resources trained to perform diagnostic and treatment activities or implement control measures. The lack of medication for timely treatment is another obstacle.

The Leishmaniasis Control Program, in conjunction with the Global Program, prepared an action plan for 2007–2009 that proposes the following: determine the burden of disease from leishmaniasis; standardize diagnostic techniques for the Region's countries with the greatest burden of disease (Brazil, Colombia, Ecuador, Panama, Paraguay, and Venezuela); and strengthen

TABLE 34. Population at risk of lymphatic filariasis and estimated number of infected persons, Region of the Americas.

Country	Population	Population at risk	Population at risk (%)	Estimated number of infected persons
Brazil	186,405,000	1,500,000	0.8	60,000
Costa Rica	4,327,000	10,000	0.2	0
Dominican Republic	8,895,000	740,000	8.3	50,000
Guyana	751,000	630,000	83.9	50,000
Haiti	8,528,000	6,000,000	70.4	560,000
Suriname	449,000	35,000	7.8	0
Trinidad and Tobago	1,305,000	0	0	0
Total	210,660,000	8,915,000	4.2	720,000

Notes: Population data is derived from PAHO Basic Indicators 2005. Data for the population at risk and estimated number of infected persons for Brazil, the Dominican Republic, Haiti, and Guyana are derived from the Weekly Epidemiological Record, No. 22, 81, pp. 221–232, 2006. Data for the population at risk and estimated number of infected persons for Suriname, Trinidad and Tobago, and Costa Rica come from 2002 figures presented in the 2004 Report of the Regional Review Program Group, Region of the Americas, to the Third Meeting of the Global Alliance for the Elimination of Lymphatic Filariasis (GAELF-III).

human resources and epidemiological surveillance of the disease. The action plan emphasizes the need to promote decentralized leishmaniasis prevention and control activities from national programs into the primary care network, empower the community, and form strategic partnerships to fight the disease.

Lymphatic Filariasis

Lymphatic filariasis is the second largest cause of disability worldwide, affecting over 120 million people in 80 countries. In the Americas an estimated 8.8 million people are at risk for lymphatic filariasis, with 720,000 persons estimated to be infected (Table 34). Lymphatic filariasis in the Americas is caused by *Wuchereria bancrofti* and is transmitted by the night-biting mosquito *Culex quinquefasciatus*. As a result of mass drug administration, and, to a lesser extent, selective treatment of individual microfilaria carriers and vector control, there has been a marked decrease in the prevalence of lymphatic filariasis in the Americas.

Lymphatic filariasis is disfiguring and painful, and affects a person's ability to work and lead a normal life. Infection is usually acquired in childhood, but the worst clinical problems (elephantiasis and genital damage) are seen in adults during their most productive years, thus imposing a significant social and economic burden. The disease typically affects the poorest people in the world's poorest countries. In the Americas, most cases are concentrated in and around urban and periurban slums.

Subsequent to the 50th World Health Assembly in 1997, which called for the elimination of lymphatic filariasis as a public health problem by the year 2020, significant progress has been made in the Region. According to consensus reached as a result of the resolution emanating out of that World Health Assembly, elimination of lymphatic filariasis would be achieved when the five-year

cumulative incidence rate is reduced to less than 1 new infection per 1,000 individuals. The focalized nature of the infection and the relatively small number of cases in the Americas suggest that this goal could be met before 2020.

Since 1981, there have been reports of transmission in seven countries: Brazil, Costa Rica, the Dominican Republic, Guyana, Haiti, Suriname, and Trinidad and Tobago. Currently, only Brazil, the Dominican Republic, Guyana, and Haiti report active transmission, with epidemiological and entomological studies indicating interruption of transmission in the other three countries.

Governments of endemic countries have been initiating programs to eliminate lymphatic filariasis primarily by mass drug administration coupled with interventions to alleviate the suffering of affected individuals. Two drugs are currently used in the Region for treating the disease, albendazole and diethylcarbamazine (DEC). Albendazole, which is donated by Glaxo Smith Kline, also acts against soil-transmitted helminths, one of the major underlying causes of malnutrition and anemia in poor children. Albendazole is usually administered in combination with DEC tablets or DEC-fortified salt. A total of 1,754,146 persons in the Region were estimated to have been treated with either DEC salt or DEC tablets plus albendazole for lymphatic filariasis in 2005 (484).

In addition, national programs in the four endemic countries are focusing their attention on the alleviation of the physical, social, and economic hardship caused by the disease. Patient education, promotion of regular hygiene, and community education and awareness programs have had an effect on reducing the morbidity associated with infection, such as swollen limbs and episodes of pain.

Haiti bears the greatest burden of lymphatic filariasis in the Americas, with an estimated at-risk population of six million, ap-

proximately 70% of the total population at risk in the Region. The largest concentration of infection is found in the country's western region. Based on current population figures and mapping results, approximately 560,000 persons are estimated to be infected (see Table 34). In 2006, mass drug administration did not proceed due to a lack of funds, but funding has been secured for 2007 and the Haitian campaign to eliminate lymphatic filariasis will continue to build on past successes. In 2005, more than 1.2 million persons were treated with DEC and albendazole, achieving a coverage of 70% in the targeted areas. In Leogane, where mass drug administration began in 2000, microfilaria prevalence below 1% was reached in all four sentinel sites, demonstrating the positive impact of the intervention. Support groups to provide care for persons affected by lymphedema are now operating in at least three communities.

The Dominican Republic has an estimated 740,000 people at risk for lymphatic filariasis infection and an estimated 50,000 infected. Recent studies revealed prevalence rates ranging from 2% to 14% using nocturnal blood films and 9% to 35% using immunochromatographic test (ICT) cards. Mapping of the principal areas has been carried out, but needs to be completed in some areas in the east and north of the country. In 2005 there was a significant increase in mass drug administration coverage in the National District, from 82% to 92.5%. The current program is based on multidisciplinary activities, and is integrated into primary health care in the province of Barahona.

Guyana has 630,000 individuals, or more than 80% of its population, at risk; 50,000 are estimated to be infected. The at-risk population is located in various regions throughout the country. In response to this, a program of DEC-fortified salt was initiated in 2003. Guyana is the only country in the Region using DEC-fortified salt as the basis of its lymphatic filariasis elimination strategy and is working to improve coverage.

In Brazil, active transmission of lymphatic filariasis exists in two foci, primarily in the metropolitan area of Recife (Pernambuco), where the entire population of nearly 1,500,000 is considered to be at risk. The second focus for active transmission is Maceió (Alagoas); however, it is considered to be in a stage of pre-elimination. Epidemiological mapping of active foci in Brazil is almost complete, with only the area of Recife remaining. The intervention strategy traditionally followed in Brazil has been that of blood surveys and selective treatment of individuals. Since 2003, part of the metropolitan area of Recife has adopted a mass drug administration strategy using DEC tablets alone, which has expanded from 18,000 initial annual treatments to just over 55,000 annual treatments in 2005. This reflects coverage of approximately 87% of the 63,800 individuals who are eligible for treatment in those areas.

Studies in Trinidad and Tobago demonstrate an absence of transmission; however, it is necessary to maintain rigorous monitoring due to the flow of tourists and migrants from endemic countries. Recent studies in Suriname also suggest an absence of

transmission, but intense surveillance along the Guyana border is required to monitor prevalence of the infection and risk of renewed transmission. Monitoring and surveillance activities in Costa Rica demonstrate there is no transmission, suggesting that lymphatic filariasis is no longer a public health problem. In addition, transmission also appears to be interrupted in the focus area of Belém, Brazil.

Despite challenges faced by some programs, including the lack of human and financial resources and, at times, political commitment, in 2007 an estimated 2.4 million persons at risk in the region will be covered by mass drug administration. Some of the determinants of this disease and its complications lie outside the purview of the health sector, including inadequate infrastructure, especially basic sanitation, water supply, drainage and waste removal, and precarious housing. Intersectoral partnerships are encouraged in order to ensure sustainability of the lymphatic filariasis elimination programs. PAHO actively encourages cooperation between the ministries of health of the seven countries where the disease is endemic, and coordinates partnerships with the U.S. Centers for Disease Control and Prevention, bilateral agencies, other United Nations agencies, the private sector, and NGOs to eliminate lymphatic filariasis in the Region.

Onchocerciasis

Infection caused by the filarial nematode worm *Onchocerca volvulus* can lead to eye lesions, including blindness, as well as severe itching and disfiguring skin lesions, known as onchocerciasis and onchocercal skin disease, respectively. Because the vectors, black flies in the genus *Simulium*, are insects whose immature stages breed in fast-flowing rivers and streams and where adult flies bite humans near these sites, the disease is also known as river blindness.

Onchocerciasis was first recognized in the Region in Venezuela in 1948, in Colombia in 1965, in Brazil in 1967, and in Ecuador in 1982. However, since 1985, there has been no convincing evidence of any expansion of existing foci in these countries. Based on historical data and estimates obtained prior to the 1990s, the total number of infected persons in the Region is estimated to be 150,000 to 200,000, while the estimated population at risk for the disease in the six countries of the Americas where it is endemic (Brazil, Colombia, Ecuador, Guatemala, Mexico, and Venezuela) was 4,700,000 persons in 1995. More data have been obtained as a result of rapid epidemiological and entomological assessments undertaken by the countries since 1995. As a result of these assessments the at-risk population estimates for 2005 dropped to a little over one-tenth, or 515,675, of the number in 1995 (Table 35). The total population at risk in the Americas now lives in only 13 restricted endemic foci in 1,950 villages, of which 232 are considered to be hyperendemic and at a higher risk of developing ocular disease. The areas at highest risk are those inhabited principally by indigenous peoples or isolated rural communities.

TABLE 35. Population at risk of onchocerciasis, communities at risk and at high risk of the disease, and endemic foci, countries of the Americas, 2004–2005.

Country	Population at risk ^a	Communities at risk ^b	Communities at high risk (hyperendemic) ^b	Endemic foci ^b
Mexico	168,819	670	39	<ul style="list-style-type: none"> • Oaxaca • Northern Chiapas • Southern Chiapas
Guatemala	199,558	518	42	<ul style="list-style-type: none"> • Huehuetenango • Sololá/Suchitepéquez/Chimaltenango • Escuintla • Santa Rosa
Colombia	1,410	1	0	<ul style="list-style-type: none"> • López de Micay
Ecuador	23,386	119	42	<ul style="list-style-type: none"> • Esmeraldas
Venezuela	113,019	625	104	<ul style="list-style-type: none"> • North-central: Aragua, Carabobo, Cojedes, Guárico, Miranda, and Yaracuy • Northeast: Anzoátegui, Monagas, and Sucre • Southern: Amazonas (Yanomami Area) • Amazonas—Roraima (Yanomami Area)
Brazil	9,483	17	5	
TOTAL	515,675	1,950	232	

^aOEPA data for 2005, via e-mail correspondence from Dr. Mauricio Sauerbrey, OEPA Director, received on July 21, 2006.

^b2004 Program Review for the Lions-Carter Center SightFirst River Blindness Programs, Cameroon, Ethiopia, Nigeria, OEPA, Sudan, and Uganda, 3–5 March 2005. The Carter Center, Atlanta, GA.

Massive drug administration of the anti-filarial drug ivermectin (Mectizan®) to the total population at risk is the core activity of the Regional initiative in each country; this is referred to as the ultimate treatment goal (UTG) (eligible population treated twice a year). The Pan American Health Foundation and the Mectizan® Donation Program in Atlanta coordinate the delivery of the drug, which is donated for free by Merck Inc. The national elimination programs coordinate regionally with the Onchocerciasis Elimination Program in the Americas or OEPA. PAHO is a member of OEPA's technical coordinating committee. National programs are monitored in terms of the percentage of the UTG attained every year in each of the endemic countries.

In Brazil, onchocerciasis is limited to one focus located in the northern part of Amazonas state and in the western part of Roraima state, bordering Venezuela. The eligible at-risk population was estimated at 7,522 individuals in 2005. The disease primarily affects Amerindians of the Yanomami and the Yek'wana ethnic groups, although immigration by miners could put other areas of Brazil at risk if competent local vectors are encountered in the miners' main residence. Brazil managed to attain 90% of its UTG in 2005, a noteworthy effort given the extreme difficulties of physical access to undeveloped forest and mountainous area. The alliance between the Ministry of Health and the nongovernmental sector to date has proven invaluable to the program as it attempts to cover all of the endemic villages.

The only known focus in Colombia is in and around the community of López de Micay, Cauca, on the Pacific coast. This community is classified as mesoendemic. Only 70 cases were identified between 1965 and 1991. The eligible population was estimated at 1,179 persons in 2005. The program attained 94% of its UTG in 2005, the seventh year in a row, and could well be approaching the interruption of transmission.

In Ecuador, the main onchocerciasis focus is located in the northwestern coastal province of Esmeraldas (the Esmeraldas/Pichincha focus) in the Santiago River basin, which has been divided into six operational areas. Satellite foci have been detected and can be traced to the migration of Chachi Amerindians from this area. The eligible at-risk population was estimated at 20,021 individuals in 2005. In that same year the program exceeded its treatment goal of 85%, achieving 98% of its UTG.

There are four foci in Guatemala, and the eligible population was estimated at 174,812 persons in 2005. The program attained 94% of its UTG in 2005, a marked improvement over previous years. In 2006 OEPA's technical coordinating committee recommended to the Government of Guatemala that ivermectin mass treatments be suspended in the Santa Rosa focus due to evidence of absence of transmission; a three-year epidemiological surveillance system was recommended to accompany any cessation of mass treatment in this focus. By the end of 2006 the Ministry of Health of Guatemala had taken the decision to end mass treat-

ment in Santa Rosa, and monitoring is under way. However, elsewhere in the country, migrants crossing the Mexico-Guatemala border could pose a challenge in securing high treatment coverage in the remaining foci in both countries.

In Mexico, the population eligible for treatment was estimated at 152,303 in 2005. The country has managed to achieve high levels of treatment coverage in the three endemic foci: in 2004 and 2005 the program attained 95% of the country's UTG. The Oaxaca focus may be approaching interruption of transmission. Mexico also has been providing ivermectin four times a year (quarterly) in 50 of its most endemic communities in the Southern Chiapas focus since 2003, in a trial aimed at hastening onchocerciasis elimination; results are pending.

Three main foci have been detected in Venezuela. Significant efforts have been made in recent years to increase coverage in its three endemic foci, the Northeastern, North-central, and Southern foci. The Southern focus is still poorly accessible (access is by boat or helicopter, the latter being very costly). Those primarily infected are Amerindians of the Yanomami, Sanema, and Yek'wana groups. In 2005 94% of its UTG was achieved. In 2006 Venezuela attained the 85% treatment goal for the first time in the Southern focus. Studies conducted in Amazonas state in Venezuela have found that the geographical distribution of competent vectors is considerably larger than that of the disease. This means new foci could be created by the migration of individuals, especially miners. This issue, as well as the migration of Amerindians across the border to and from Brazil, requires added attention and needs to be placed in the wider context of improving access of these migratory populations to general primary health care services on both sides of the border.

In summary, onchocerciasis has been recognized as a problem for which there is now a relatively easy and economical solution. With the advent of ivermectin in 1987 and the Mectizan® Donation Program, the disease can be suppressed and controlled globally with chemotherapy. Morbidity and transmission rates in the countries have dropped significantly in response to the Regional initiative. It is probable that the Americas will be the first region in the world where ocular morbidity from onchocerciasis will cease to be a public health problem (OEPA's target: end of 2007) and where transmission will be interrupted in most if not all endemic foci. Mexico and Colombia are approaching this stage, followed by Ecuador and Guatemala. Currently, the hard to reach areas of Venezuela and Brazil continue to pose the greatest challenge to the elimination of onchocerciasis from the Region.

EMERGING AND REEMERGING INFECTIOUS DISEASES

The international spread of infectious diseases continues to pose a problem for global health security due to factors associated with today's interconnected and interdependent world—population movements through tourism, migration, or as a result of disasters; growth in international trade in food and biological products; social and environmental changes linked with urban-

ization, deforestation, and climate change; and shifts in the methods of food processing, distribution, and patterns of consumption. These factors have reaffirmed that infectious disease events in one country or region are of potential concern for the entire world (485).

An additional concern is the possibility of outbreaks resulting from the intentional or accidental release of biological agents. Epidemics that might occur naturally and those due to the release of biological agents both present a threat to global health security. Recent examples of these are the deliberate release of anthrax in the United States; the severe acute respiratory syndrome (SARS) epidemic; and the emergence of a new highly pathogenic strain of avian influenza H5N1 that has alerted the world to the possible emergence of a new pandemic influenza strain.

In the Americas, there were significant infectious disease outbreaks in 2001–2006 that required international collaboration and collective action in detection, confirmation, and/or public health intervention. In Martinique, chikungunya was imported from the Island of Reunion; in Belize, for the first time, West Nile virus was detected in a horse; in Bolivia, a chickenpox case being misreported through informal channels as a smallpox case resulted in an international rapid response; in Guatemala, a cluster of acute respiratory infections of unknown etiology in a health care setting prompted national and international rapid response teams to deploy and contain the outbreak in fear that a new influenza strain had emerged; a Rocky Mountain spotted fever outbreak was described for the first time in Urubá, Colombia, requiring international assistance in implementing prevention measures; and *E. coli* O157:H7 outbreaks affected tourism and food trade in Mexico and the United States.

Factors relating to the management of epidemics can also escalate an epidemic into a public health emergency of international concern. Some such factors include the absence of correct information, misinformation, or inconsistent information available to national governments, which can result in overreaction to media coverage and subsequent internal pressure on the governments to respond; insufficient capacity at the country level to recognize disease events in a timely manner and to contain them; fear of costly repercussions if disease events are notified; and lack of appropriate international response mechanisms, both legal and technical (485). Given all these factors, the need for international cooperation in the detection and response to epidemics has become critical. Such cooperation has been pursued by PAHO and WHO, using the 1969 International Health Regulations and the revised version adopted in 2005 as a legal framework.

The 2005 revised International Health Regulations, IHR (2005), adopted by the 58th World Health Assembly, have been redesigned so as to provide a new international legal framework for the control of transborder infectious diseases (485). The IHR (2005) also has set out country core capacities for the detection and response to health threats—early warning and surveillance systems, epidemiological and outbreak investigation capabilities, laboratory expertise and infrastructure, information and com-

munication mechanisms, and management systems (486). Their purpose and scope is to prevent, protect against, control, and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks, while avoiding unnecessary interference with international traffic and trade (487).

Moreover, countries need to develop core capacities to respond to the political and administrative decentralization and health sector reform processes, which are profoundly changing the management, organization, delivery, and financing of Latin America's and the Caribbean's health services. These processes are redefining the functions of central, regional, and local governments in managing both individual and population-based health care services. Therefore, countries need to strengthen their health service infrastructure and establish an ongoing process for building institutional capacity to detect and intervene in a timely, effective, efficient, and sustainable manner in public health emergencies caused by epidemics (488).

The Subregional Surveillance Networks of Emerging and Reemerging Infectious Diseases (Southern Cone, Amazon Basin, Central America, and the Caribbean) were created under the principle of interaction between laboratory services and epidemiology. The networks provide fora in which countries can collaborate with one another to monitor, prevent, and control communicable diseases that represent common threats to the countries in each subregion; coordinate surveillance and control standards or protocols; exchange and optimize human, material, and financial resources; and create systematic coordinated mechanisms of action among all countries.

Influenza Pandemic Preparedness in the Americas

Influenza is a viral disease that affects both animals and humans. When a new strain of influenza virus emerges and adapts to enable transmission from person to person, the disease can quickly spread far and wide, resulting in a pandemic. Although the disruption caused by influenza pandemics is often compared to natural disasters, a pandemic is more likely to affect a larger portion of the population with widespread and sustained effects, overstressing the resources of every country, state, and municipality. Such a strain will challenge the possibility of shifting resources, emphasizing the need for all countries to develop pandemic preparedness plans.

The 56th World Health Assembly and the 44th Directing Council of the Pan American Health Organization, held in 2003, issued resolutions urging countries to strengthen their capacity to prevent, detect, and diagnose influenza virus infection, and to be prepared to respond to a pandemic situation (489, 490). These contingency plans must be put in place now, during the inter-pandemic period, to better respond to this threat with potentially catastrophic consequences worldwide.

In 2006, some 130 million people (23% of the total population) lived in rural areas of Latin America and the Caribbean

(491), most of them coming in direct contact with chickens and pigs. The Food and Agriculture Organization of the United Nations (FAO) reports that poultry accounts for approximately 70% of the animal protein consumed in Latin America and the Caribbean (492). Also, the expanding poultry industry has become a major source of income and employment, contributing to urban and periurban development. The impact of a pandemic in the Region would represent not only a public health problem, but also a food security threat and an economic disaster for the poorest population in rural areas and for national economies.

Considering the threat posed by a possible influenza pandemic, in 2005 a multidisciplinary task force on epidemic alert and response was created within PAHO to advise, coordinate, and monitor all activities of the Organization related to the planning and implementation of influenza pandemic preparedness and response, within the framework of the new mandates set forth by IHR (2005) (493). These stipulate that countries develop, strengthen, and maintain core capacities to detect, assess, and intervene to control events of international public health importance. The interprogrammatic nature of the task force allows it to better tackle the complex process involved in IHR implementation and better plan for an influenza pandemic, which requires highly coordinated efforts from a variety of sectors.

The focus of PAHO's technical cooperation has been initially to assist Member States in drafting National Influenza Pandemic Preparedness Plans (NIPPPs), taking into account the recommendations for national measures before and during pandemics presented in WHO's Global Influenza Preparedness Plan (494). Box 10 summarizes key steps in the development and assessment of NIPPPs.

These multisectoral plans must integrate human and veterinary health and be flexible enough to consider multiple scenarios of potential pandemic impact according to different levels of viral pathogenicity and availability of resources. Subregional workshops have been carried out to train those charged with preparing NIPPPs in the use of modeling software, tools that the U.S. Centers for Disease Control and Prevention (CDC) have developed to estimate the potential impact of a given pandemic (495–497). This enables countries to ensure that their national plans are flexible by considering many contingencies, including a worst-case scenario where there are neither available vaccines nor antiviral medications. Table 36 summarizes estimates of potential pandemic impact in Latin America and the Caribbean for a 1968-like and a 1918-like scenario that were prepared by country teams during those workshops.

After Member Countries provided draft plans, a series of self-assessment exercises were carried out, in which NIPPPs were evaluated using a PAHO-developed tool based on WHO's checklist for influenza pandemic preparedness planning (498). The tool covers the seven core components in WHO's checklist: emergency preparedness; surveillance; case investigation and treatment; preventing spread of the disease in the community; maintaining essential services; research and evaluation; and implementation,

BOX 10. PAHO Strategy in Support of Member States for the Development and Assessment of National Influenza Pandemic Preparedness Plans (NIPPPs)

1. Development of draft NIPPPs:
 - a. Introduction of WHO guidelines for pandemic preparedness planning.
 - b. Introduction and application of modeling tools such as FluAid, FluSurge, and FluWorkloss in order to estimate the potential impact of a pandemic.
 - c. Development of national action plans that adequately incorporate the drafting of NIPPPs.
2. Assessment and testing of draft NIPPPs:
 - a. Self-assessment of NIPPPs.
 - b. Table-top exercises to highlight issues of chain of command and need for multisectoral integration and coordination.
 - c. Development of action plans to address remaining gaps identified during the self-assessment and simulation exercises.
3. Local implementation of NIPPPs:
 - a. Development of simulation drills and table-top exercises to test local preparedness and put local contingency plans into practice.
 - b. Promotion of subnational, multisectoral training to promote the development of local contingency plans in the event of a pandemic that adequately incorporate all pertinent areas, including surveillance, health services, disaster management, and social communication.
 - c. Carrying out of table-top exercises to test the completeness of local plans, taking into account subnational realities.
4. Monitoring and strengthening of NIPPPs:
 - a. Promotion of the use of subnational drills to assist in the monitoring of "suitability" of local contingency plans.
 - b. Promotion of any necessary changes in order to update plans.

testing, and revision of the national plan. These core components are further divided into 44 main categories, comprising a total of 368 checkpoints for assessment. One of the major achievements of this interaction was the generation of multisectoral discussions about the required steps for completing the national plans, promoting joint work, and integrating the contingency planning process. Table 37 presents the average compliance (%) of the Region's four subregions with WHO guidelines for each of the seven core components of a NIPPP.

Influenza pandemics have historically taken the world by surprise, leaving minimal time for health services to prepare for the surge in cases and deaths that characterize these events and make them so disruptive (499). The current situation is markedly different, as the world has been warned in advance, providing an unprecedented opportunity, especially in the Americas, to prepare for a pandemic and develop ways to mitigate its effects even in areas with problems of access to basic health services.

Evidence suggests that an influenza pandemic will be most intensely felt at the community level, especially among the young, the poor, and other vulnerable groups (500). Despite tremendous strides in advocating for influenza pandemic preparedness at the

national level, a significant challenge lies in bringing preparedness to local policymakers, practitioners, and concerned citizens who will be called on to implement national plans. In order to bridge the current gap between planning and implementation, local counterparts must be encouraged and enlisted to take part in the national planning process. Such local implementation of NIPPPs will be tested through simulation drills and table-top exercises to test local preparedness and to put local contingency plans into practice.

Current global threats, including an influenza pandemic, require a concerted effort by all those capable of effective action. Moreover, the intersectoral effort must harness the participation of the private sector, nongovernmental organizations, and academia. Undoubtedly, more resources will be needed to stimulate counterpart support by the countries, to piggy-back on and expand existing surveillance systems to become population-based, and to scale up the preparedness and rapid response at the local level. Access to drugs, vaccines, and other supplies is as yet an unresolved issue.

The threat of an influenza pandemic has revealed the weaknesses of some systems in the Americas, but it once again has highlighted the strong determination among the countries of the

TABLE 36. Potential impact of an influenza pandemic with a 25% clinical attack rate, by main health impact and severity scenario, Latin America and the Caribbean, 2006.

Potential health impact	Pandemic scenario	
	1968 (moderate)	1918 (severe)
Deaths	334,163 (131,630–654,960)	2,418,469 (627,367–5,401,035)
Hospitalizations	1,461,401 (459,051–1,937,503)	11,798,613 (3,189,747–16,418,254)
Outpatient visits	76,187,593 (59,738,730–109,207,769)	68,470,386 (58,114,124–92,227,761)

Source: Pan American Health Organization, Washington, D.C.

TABLE 37. Current compliance (%) with WHO checklist for influenza pandemic preparedness planning, by core component and subregion, Latin America and the Caribbean, mid-2006.

Core component	Andean Area	Central America	Caribbean	Southern Cone
1. Emergency preparedness	38.6	34.6	56.7	58.5
2. Epidemiological surveillance	37.0	34.8	56.5	54.4
3. Case management	52.3	54.5	48.9	60.9
4. Population containment	20.0	38.0	37.0	64.0
5. Essential services continuity	24.5	33.3	45.2	41.9
6. Research and evaluation	10.0	40.0	15.0	30.2
7. Implementation of the national plan	40.0	60.0	30.0	50.0

Source: Pan American Health Organization, Washington, D.C.

Region to work together quickly to overcome disparities and to share information (Box 11). Technical cooperation has served to further strengthen public health in the countries, which represents an extraordinary global contribution and, ultimately, could save many lives.

Severe Acute Respiratory Syndrome

Severe acute respiratory syndrome (SARS) was first recognized at the end of February 2003 in Hanoi, Vietnam. It is believed to have originated in southern China in November 2002; by February 2003, it had crossed into Hong Kong (China). Shortly after, in mid-March, WHO considered it a global threat. As of 5 July 2003, when the last human chain of transmission had been broken, 26 countries had been affected, resulting in 8,096 probable cases and 774 deaths (501).

Canada and the United States were the only two countries in the Americas that reported probable SARS cases. After China and Hong Kong, Toronto, Canada, was the Region's hardest hit area by SARS, with 438 probable/suspected cases, including 44 deaths. The toll on health care workers was especially high: more than 100 fell ill and 3 died. In the United States, 27 cases were reported and no deaths (502).

The etiological agent, SARS coronavirus (SARS-CoV), is thought to be an animal virus that crossed the species barrier from animal to humans and adapted itself, enabling human-to-

human transmission (503). Although the natural reservoir of SARS-CoV has not been identified, several animal species are potentially involved, since a variety of animals, including the Himalayan masked palm civet (*Paguma larvata*), the Chinese ferret badger (*Melogale moschata*), the raccoon dog (*Nyctereutes procyonoides*), ferrets (*Mustela furo*), and domestic cats (*Felis domesticus*), have tested positive for SARS-CoV infection (502). Investigations of modes and routes of transmission from animals to humans or other animal species are still being conducted.

The most probable sources of recent infection are exposures in laboratories that handle the virus for research purposes or from animal reservoirs. Since July 2003, there have been four events of SARS reemergence. Three of them were attributed to breaches in laboratory biosafety and resulted in one or more cases (Singapore, Taipei, and Beijing) (504, 505). The fourth event resulted in four sporadic, community-acquired cases arising over a six-week period in Guangzhou, Guangdong province of China. Three of the cases were attributed to exposure to animal or environmental sources, while in the other case the source of exposure remains unknown (504).

These events demonstrate the possibility of a resurgence of a SARS outbreak, thereby stressing the need for all countries to remain vigilant and maintain their capacity to detect and respond to the disease.

The WHO Guidelines for the Global Surveillance of Severe Acute Respiratory Syndrome (SARS); Updated Recommenda-

BOX 11. Achievements of PAHO Member States in Developing and Assessing NIPPPs

- Professionals from various sectors are working together, often for the first time, on building national capacity to cope with a pandemic.
- Countries are creating, analyzing, and refining their NIPPPs in an integrated and coordinated fashion.
- Pandemic influenza preparedness is included in the health agendas of the Regional Integration Systems (MERCOSUR, CARICOM, CAN, SISCA).
- The public health infrastructure is bolstered, targeted to a possible influenza pandemic but applicable to an array of public health emergencies.
- A regional cadre of professionals is trained in multiple aspects of influenza preparedness—health services delivery, surveillance, risk and social communication, and disaster and emergency management.
- There are professionals who are able to replicate training to associates and colleagues at the subnational levels.
- Trained professionals are committed to continue to pursue influenza preparedness activities.

TABLE 38. Cases of hantavirus pulmonary syndrome, Region of the Americas, 1993–2005.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Argentina														
Cases	21	10	10	42	51	67	81	68	92	86	54	61	...	643
Deaths						11				...	...	...	...	11
Bolivia														
Cases	3		1	1	7	6	2	1	5	8	11	7	18	70
Deaths										...		2	3	5
Brazil														
Cases	3		1	3		11	28	56	77	75	84	159	167	664
Deaths	2		1	3		7	12	19	24	...	...	53	...	121
Canada														
Cases		8	3	3	7	6	2	1	...	44	14	...	...	88
Deaths											...	...	...	...
Chile														
Cases			1	3	30	35	26	31	81	65	60	56	67	455
Deaths			...	...	18	20	11	12	30	19	18	18	21	149
Panama														
Cases							3	21	5	2	4	...	...	35
Deaths								1			2	...	...	3
Paraguay														
Cases		16	15	5	4	5	4	15	27	4	4	...	...	99
Deaths			2	1	1	0	2	2	5	...	...	...	...	13
Uruguay														
Cases					2	3	12	8	4	9	10	...	...	48
Deaths					1	2	1	1	0	3	5	...	...	13
United States														
Cases	21	20	14	15	18	24	30	35	8	13	22	19	27	266
Deaths	27	12	10	7	5	9	13	11	3	10	9	7	9	132
Venezuela														
Cases										2	...	...	...	2
Deaths										...	...	...	...	...
Total cases	48	54	45	72	119	157	188	236	299	308	263	302	279	2,370
Total deaths	29	12	13	11	25	49	39	45	63	32	34	80	33	465

TABLE 39. Cholera cases, Region of the Americas, 1991–2005.

Country/territory	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Region of the Americas	396,536	358,174	210,972	127,187	75,690	21,028	17,923	57,312	9,683	2,703	534	23	32	36	24
Argentina	—	553	2,080	889	188	474	637	12	1	1	—	—	—	—	—
Belize	—	159	135	6	19	26	2	28	12	—	—	—	—	—	—
Bermuda	...	...	...	...	...	...	...	—	—	—	—	—	—	—	—
Bolivia	206	22,260	10,134	2,710	3,136	2,847	1,632	466	—	—	—	—	—	—	—
Brazil	2,103	37,572	60,340	51,324	4,954	1,017	3,044	2,745	4,717	750	7	—	5 ^e	21	5
Canada	3	5	7	2	5	3	—	3	3	5 ^d	6 ^e	4	—	3	7
Chile	41	73	32	1	—	1	4	24	—	—	—	—	—	—	—
Colombia	16,800	13,287	609	996	1,922	4,428	1,508	442	20	1	—	—	—	2	—
Costa Rica	—	12	14	37	24	19	1 ^a	—	—	—	—	—	—	—	—
Ecuador	46,284	31,870	6,883	1,785	2,160	1,059	65	3,755	171	27	9	...	25	5	—
El Salvador	947	8,106	6,573	11,739	2,923	182	—	8	134	63 ^d	—	—	—	—	—
Guayana	1	16	2	...	...	...	...	—	—	—	—	—	—	—	—
Guatemala	3,664	15,861	30,821	16,779	7,970	1,568	1,263	5,970	2,077	178	13	1	—	—	—
French Guiana	—	556	66	—	—	—	...	—	—	—	—	—	—	—	—
Honduras	17	407	4,013	5,049	4,717	708	90	306	56	15	1	—	—	—	—
Mexico	2,690	8,162	10,712	4,059	16,430	1,088	2,356	71	9	5	1	—	—	—	—
Nicaragua	1	3,067	6,631	7,881	8,825	2,813	1,283	1,437	545	12	—	—	—	—	—
Panama	1,178	2,416	42	9	—	—	—	—	—	—	—	—	—	—	—
Paraguay	—	—	3	—	—	4	—	—	—	—	—	—	—	—	—
Peru	322,562	210,836	71,448	23,887	22,397	4,518	3,483	41,717	1,546	934	494	16	—	—	—
Suriname	—	12	—	—	—	—	—	—	—	—	—	—	—	—	—
United States	26	102	18	34	20	5	4 ^b	15 ^c	6 ^b	4 ^a	3	2 ^d	2 ^d	5	12 ^e
Venezuela	13	2,842	409	—	—	268	2,551	313	386	140	—	—	—	—	—

^aOne imported case.^bThree imported cases.^cEight imported cases.^dTwo imported cases.^eFive imported cases; one unknown.

— No cases reported.

... Data not available.

Source: Ministries of health.

Updated in October 2006.

tions October 2004 and WHO SARS Risk Assessment and Preparedness Framework are two documents intended to be used together by the countries. The latter introduces important changes to the global risk assessment and case definitions for SARS, thus replacing all previous WHO guidance on SARS surveillance and response. The former sets out a framework for national and international levels to assess the risk of SARS reemergence and prepare appropriate contingency plans.

Hantavirus Pulmonary Syndrome

In the Americas, hantavirus pulmonary syndrome (HPS) was first described in North America in 1993. Since then, up to 2004, the number of HPS cases totals 2,196. The average annual number of cases reported from 1993 to 1999 was 108. Since 2000, the average number of annual cases increased to 281. Argentina, Bolivia, Brazil, Canada, Chile, Panama, Paraguay, the United States, Uruguay, and Venezuela have reported cases (Table 38).

No new viruses have been identified other than the ones previously described in the Region, namely, Oran, Lechiguanas, Hu39694, Andes virus, Rio Mamore virus, Laguna Negra, Sin Nombre, New York, Bayou, Black Creek Canal, Choclo, and Calabazo.

Even though the severity of cases relates to the specific viral strain and the patient's immunological response, in general case fatality rates from HPS consistently decreased from approximately 50% in 1996–2000 to 30% in 2001–2005 in countries with the highest rates (506).

Cholera

Since the cholera pandemic of 1991, the Region of the Americas has observed a steady decline in the number of reported cases (Table 39). A marked decrease was observed in 2002, with only 23 cholera cases reported to WHO from Peru (16), Canada (4), the United States (2), and Guatemala (1). From 2003 through 2005, the total number of cases reported in the Region was similarly low, with 32, 36, and 24 cases, respectively. It should be noted that in analyzing the data, Brazil, Canada, and the United States have consistently reported cases and in some years they have made the distinction between indigenous and imported cases. In the Region, the occurrence of cholera cases was characteristically limited to clusters that were rapidly contained with very low public health impact. Many countries continue to implement passive and active surveillance to detect circulating *Vibrio cholerae*.

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APPENDIX. List of the Leading Causes of Death (ICD-10/LC)

Total	A00–R99, V01–Y89
LC-01	Intestinal infectious diseases (A00–A09)
LC-02	Tuberculosis (A15–A19)
LC-03	Vector-borne diseases and rabies (A20, A44, A75–A79, A82–A84, A85, A90–A96, A98.0–A98.2, A98.8, B50–B57)
LC-04	Vaccine-preventable diseases (A33, A37, A80, B01, B05, B06, B15, B16, B17.0, B18.0, B18.1, B18.9, B19, B26)
LC-05	Meningitis (A39, A87, G00–G03)
LC-06	Septicemia (A40–A41)
LC-07	Human immunodeficiency virus (HIV) disease (B20–B24)
LC-08	Malignant neoplasm of esophagus (C15)
LC-09	Malignant neoplasm of stomach (C16)
LC-10	Malignant neoplasm of colon, sigmoid, rectum, and anus (C18–C21)
LC-11	Malignant neoplasm of liver and intrahepatic bile ducts (C22)
LC-12	Malignant neoplasm of gallbladder or of other unspecified parts of the biliary tract (C23, C24)
LC-13	Malignant neoplasm of pancreas (C25)
LC-14	Malignant neoplasm of larynx (C32)
LC-15	Malignant neoplasm of trachea, bronchus, and lung (C33, C34)
LC-16	Melanoma and other malignant neoplasms of skin (C43, C44)
LC-17	Malignant neoplasm of female breast (C50)
LC-18	Malignant neoplasms of the uterus (C53–C55)
LC-19	Malignant neoplasm of ovary (C56)
LC-20	Malignant neoplasm of the prostate (C61)
LC-21	Malignant neoplasm of kidney, except renal pelvis (C64)

LC-22	Malignant neoplasm of bladder (C67)
LC-23	Malignant neoplasm of brain (C71)
LC-24	Malignant neoplasms of the hematopoietic and lymphatic systems (C81–C96)
LC-25	In situ neoplasms or of uncertain or unknown behavior (D00–D48)
LC-26	Diabetes mellitus (E10–E14)
LC-27	Malnutrition and nutritional anemias (D50–D53, E40–E64)
LC-28	Volume depletion or other disorders of fluid, electrolyte, and acid-base balance (dehydration) (E86–E87)
LC-29	Dementia and Alzheimer’s disease (F01, F03, G30)
LC-30	Mental and behavioral disorders due to psychoactive substance use (F10–F19)
LC-31	Parkinson’s disease (G20)
LC-32	Epilepsy and status epilepticus (G40, G41)
LC-33	Chronic rheumatic heart diseases (I05–I09)
LC-34	Hypertensive diseases (I10–I15)
LC-35	Ischemic heart diseases (I20–I25)
LC-36	Pulmonary heart disease and diseases of pulmonary circulation (I26–I28)
LC-37	Nonrheumatic mitral valve disorders (I34–I38)
LC-38	Cardiomyopathy (I42)
LC-39	Cardiac arrest (I46)
LC-40	Cardiac arrhythmias (I47–I49)
LC-41	Heart failure, complications, and ill-defined diseases of the heart (I50–I51)
LC-42	Cerebrovascular diseases (I60–I69)
LC-43	Atherosclerosis (I70)
LC-44	Aortic aneurysm and dissection (I71)
LC-45	Acute upper respiratory infections except influenza and pneumonia (J00–J06, J20–J22)
LC-46	Influenza and pneumonia (J10–J18)
LC-47	Chronic lower respiratory diseases (J40–J47)
LC-48	Pulmonary edema and other respiratory diseases affecting the interstitium (J80–J84)
LC-49	Respiratory failure (J96)
LC-50	Diseases of the appendix, hernia, and intestinal obstruction (K35–K46, K56)
LC-51	Cirrhosis of the liver and other chronic liver diseases (K70–K76)
LC-52	Diseases of the musculoskeletal system and connective tissue (M00–M99)
LC-53	Diseases of the urinary system (N00–N39)
LC-54	Pregnancy, childbirth, and the puerperium (O00–O99)
LC-55	Certain conditions originating with the perinatal period (P00–P96)
LC-56	Congenital malformations, deformations, and chromosomal abnormalities (Q00–Q99)
LC-57	Traffic accidents (terrestrial) (V00–V89)
LC-58	Accidental falls (W00–W19)
LC-59	Handgun discharge (unintentional) (W32–W34)
LC-60	Accidental drowning and submersion (W65–W74)
LC-61	Other accidental threats to breathing (W75–W84)
LC-62	Accidental poisoning (X40–X49)
LC-63	Intentional self-harm (suicides) (X60–X84)
LC-64	Assault (homicides) (X85–Y09)
LC-65	Event of undetermined intent (Y10–Y34)
LC-88	Others
LC-99	Ill-defined causes (R00–R99)