

# MEXICO



**T**he United States of Mexico is a representative and democratic republic consisting of 32 federal entities: 31 states and the Federal District (Mexico City, capital of the country). The federal and state governments are hierarchically equal and abide by principles of autonomy and association.

## GENERAL CONTEXT AND HEALTH DETERMINANTS

The federal and state governments change every six years, and municipal governments change every three years. Between 2001 and 2006, the country was governed by a different political party for the first time in seven decades. In July of 2006, presidential elections were held that resulted in a virtual tie between the two parties. The slight difference in favor of one of the parties prolonged by more than two months the decision of the Electoral Tribunal of the Judicial Branch of the Federation (TRIFE) in declaring an official winner, amid political crisis and massive protests.

### Social, Political, and Economic Determinants

The Mexican economy grew 4.2% in 2004 and 3.0% in 2005, while the per capita gross domestic product (GDP) grew 1.6% between 2004 and 2005 and inflation remained stable. The per capita GDP went from US\$ 5,110 in 2000 to US\$ 6,230 in 2003 (1). Remittances sent to Mexico have grown annually by more than 20% since 2002, and in 2005 they surpassed US\$ 20 billion. In 2004, remittances accounted for approximately 70% of foreign income from oil and 87% from the maquilador sector (2). Remittances constitute a strong source of income and economic activity with important repercussions for populations living in the country's interior. The economically active population has maintained high levels of employment since 2001, between 95% and 96%. In the first quarter of 2006, employment was maintained at around 96.3%, with no difference between men and women (3). Six states in northern Mexico that border the United States of America (U.S.A.) receive close to 29% of the direct foreign investment, constitute 23% of the national GDP, and represent 17% of the population (4). In 2004, the Federal District and the State of México supplied more than 30% of the national GDP, while states such as Chiapas, Oaxaca, Campeche, and Yucatán collectively accounted for 6% of the national GDP (5).

The three categories defined by the Technical Committee on Poverty Measurement (CTMP) are: food poverty (households with insufficient income to satisfy basic food needs); capacity

poverty (households that cannot satisfy their basic food, health, and educational needs); and patrimony poverty (households that cannot satisfy their basic food, health, education, clothing, shoes, housing, and public transportation needs). The National Household Income and Expenditure Survey (ENIGH 2000) found that 24.2% of the population lived with food poverty (42.4% rural and 12.6% urban); that 31.9% lived with capacity poverty (50.0% rural and 20.2% urban); and 53.7% lived with patrimony poverty (69.3% rural and 43.8% urban) (6). The 2004 ENIGH showed a reduction in levels of poverty: food poverty included 17.3% of the population (27.6% rural and 11.0% urban); capacity poverty was 24.6% (35.7% rural and 17.8% urban); and patrimony poverty was 47.0% (56.9% rural and 41% urban). In absolute terms, this signifies a reduction in food poverty between 2000 and 2004 of 5.6 million people, largely in rural areas. This reduction is considered a positive trend, but it is not sufficient to achieve the Millennium Development Goal (MDG 1) of reducing by half between 1990 and 2015 the percentage of persons living in extreme poverty. The main government program to fight poverty and improve human development is the Opportunities Program, where mothers receive monetary support to improve the nutrition, health, and education of their families. In 2005, the program had 5 million households enrolled, selected based on household socioeconomic characteristics (7).

In 2002, the poorest 10% of the population received 1.4% of the national income, while the richest 10% received 40.5% (8). The levels of poverty in Mexico continue to be high for a high-income country; Mexico has been a member of the Organization for Economic Cooperation and Development (OECD) since 1994, which includes the 30 most industrialized countries of the world, in which the Mexican economy ranks 9th (9).

Over the last 15 years, Mexico has improved its place on the Human Development Index (HDI), and in 2005 was categorized as one of the countries with high human development and ranked 53rd with a score of 0.814 (10). However, while estimating the HDI in terms of subnational units and municipalities, significant differences in development are seen. The Report on Human Development in Mexico 2004 (11) ranked 14 states with an HDI greater than 0.800 (high human development), and the 18 remaining states showed midlevel human development. The

range varied from 0.883 in the Federal District to 0.707 in the State of Chiapas. The same report grouped the Mexican states into five regions, and the highest value (0.873) in human development belonged to the Northeast Region, which is composed of the states of Coahuila, Chihuahua, Durango, Nueva León, and Tamaulipas (four of them share a border with the U.S.A.). The other extreme was found in the states of Campeche, Chiapas, Guerrero, Oaxaca, Quintana Roo, Veracruz, and Yucatán (HDI 0.742), located in the south of the country. When this index is measured at the municipal level, the differences are even more strongly demarcated, going from 0.38 in the municipality of Metlatónoc in the State of Guerrero to 0.91 in the Benito Juárez area of the Federal District (11).

The marginalization index of the National Population Council (CONAPO) (12) uses data on population size, education level, and housing and income characteristics that together measure the difficulties in technological development, as well as the social exclusion of population groups who do not benefit from certain benefits or goods. The 2000 CONAPO report showed that the states of Chiapas, Guerrero, Hidalgo, Oaxaca, and Veracruz were highly marginalized, and Chiapas, located on the border with Guatemala, had the highest level of marginalization in the country. In Chiapas, 23% of the population older than 15 years is illiterate, 50% of the state's population did not complete primary education, 25% of the houses did not have piped water, and 40% had dirt floors (12). Nine federal states were considered to be highly marginalized; six had midlevels of marginalization; eight had low marginalization; and four had very low marginalization. The marginalization index at the municipal level shows even greater variation. Of the 2,444 municipalities, 1,292 were highly or very highly marginalized and also included historically defined territorial patterns and a concentrated indigenous population. The gaps, the inequities, and the differences in opportunity among the population groups are characteristic of Mexico in the context of a multicultural, multiethnic, and multilingual nation.

In 1992 the Mexican Constitution recognized the country as being multicultural, although this has not had any important legal repercussions. After the armed uprising of the National Liberation Zapatista Army (EZLN) in 1994, recognition for indigenous communities and the established autonomous groups in the south has advanced. The fights for water, land access, and employment are important to the indigenous peoples, as are political and religious conflicts and the use and abuse of natural resources in their territories, some of which have been privatized (13). High levels of corruption exist in the political, judicial, and police systems. A lack of security, attacks, kidnappings, and assassinations have continued despite the efforts of government forces, which have not been able to stop organized crime and the drug-trafficking cartels that operate in the country and that caused 1,500 deaths during 2005 (14).

Universal literacy has been reached among youth between 15 and 24 years of age, and the rate of enrollment at primary school

for children between 6 and 11 years reached 99.4% in 2004. In 2000, 90.5% of women aged 15 and older knew how to read and write, and 70.5% of the population older than 15 years had completed primary school (15). The average level of education was 7.7 completed grades (7.8 among males and 7.3 among females); the states with the highest levels of education were the Federal District (9.7) and Nuevo León (8.9), and the lowest were Chiapas (5.6), Oaxaca (5.8), and Guerrero (6.3), which have the largest indigenous population in the country. Efforts are focused on those federal entities with the largest levels of marginalization but that also have percentages of primary school enrollment greater than 97%. Among vulnerable populations, such as indigenous populations, rural communities, and migrants, these indicators show the historical gaps in access to education; for example, 40% of the indigenous population older than 15 years has not completed primary school.

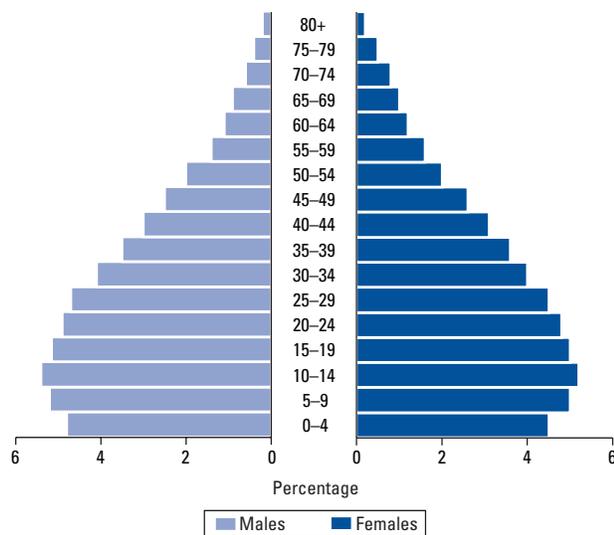
Environmental problems remain a challenge. The proportion of lands covered by forests or jungles dropped from 36.6% to 33.4% between 1993 and 2002, with a negative impact on the conservation of natural resources and water and on prevention of natural disasters. As a positive indicator, the proportion of lands protected as natural areas grew from 5.5% in 1995 to 9.1% in 2002 (16).

### Demographics, Mortality, and Morbidity

In 2006, Mexico's population was estimated to be 107,525,207, with 24% living in rural areas. The total fertility rate was 2.07 (2.6 in Oaxaca and 1.8 in the Federal District), with a growth rate of 0.99%. In 2006, it was estimated that 1,942,914 children were born. The specific fertility rate per 100 women between 15 and 19 years was estimated to be 4.9, with extremes in the State of Guerrero (7.1) and the Federal District (1.3). The general mortality rate was 4.5 per 1,000 population (5.0 in men and 4.0 in women). In 2006, approximately 479,000 people died. By 2010 the total fertility rate is expected to drop to 1.97, with a growth rate of 0.88% (17), and the population will reach 111.6 million. Life expectancy at birth in 1995 was 70 years for men and 75 for women, and in 2006 it is estimated to be 74 years for men and 78 years for women (18).

The adolescent population doubled in absolute numbers over the past 30 years; the population of those 15–29 years was 30.2 million in 2004 (28.7% of the total population) and continues to grow (19). Half of adolescent youths (49.9%) live in seven of the 32 federal entities (20). In 2005, the school-aged population (youth less than 14 years) was 30% of the total, and by 2010 will drop to 26.7%. By comparison, the population of productive age (15–59 years) will grow from 62.3% to 64.5% for the same period, and the population of adults older than 60 years will grow from 7.7% to 8.8% (18).

It is estimated that between 2005 and 2025, due to the sustained decrease in the fertility rate, the population replacement

**FIGURE 1. Population structure, by age and sex, Mexico, 2005.**

rate will be maintained (each couple has the number of children to replace them on the population pyramid), and by 2025 it will decline to 1.85 children per woman. These results are congruent with the population policies oriented to satisfy the demands for contraceptives, and it is estimated that by 2006 more than 74% of women of reproductive age will be using some method of contraception. Consequently, the demographic transition will change the population pyramid, with more persons of productive age and older persons. (See Figure 1 for the country's population structure in 2005).

Between 2005 and 2025, Mexico will experience a "demographic bonus," where a beneficial relationship will exist in the ratio between the population of productive age (15–59) and the dependent population (children less than 14 years and those older than 60). Given the smaller burden of the dependent population on Mexican families, it is considered that this period will represent an opportunity that will favor development policies, a generation of employment, the formation of social and human capital, and, above all, an opportunity to reduce disparities (21). This period will also be characterized by an increase in the demand for middle- and high-level education, access to health services and social security, as well as housing needs. The dependency rate (relationship between the population less than 15 years and those older than 64 years to the population between 15 and 64 years, expressed as a percentage) was estimated to be 61.9% in 2004 (22).

In 2000, the healthy life expectancy (HALE), taking into consideration the extremes among the states, was 55.2 to 63.1 years for men and 61.0 to 67.3 years for women. This indicator measures the years of life a person can live without disability. The five leading causes of loss of healthy years are perinatal injuries, road traffic injuries, diabetes, violence, and cardiopathies.

A significant migration of Mexicans to the U.S.A. has occurred historically and continues. In 2002, it was estimated that 9,503,928 U.S. residents were born in Mexico (23). It is also estimated that 24 million persons of Mexican origin (born in Mexico or children of Mexicans) reside in the U.S.A., representing 11.6% of the total population (24). The net international migration is  $-0.38\%$  annually, predominantly in men, and it is expected to remain constant until 2010. The states with the highest emigration of Mexicans to the U.S.A. are: Jalisco (18%), Michoacán (12%), Guanajuato (8%), and Zacatecas (8%). A total of 162 municipalities are considered to have high levels of migration, of which 30 are located in Oaxaca, 28 in Michoacán, and 25 in Jalisco.

In 1980, the leading causes of death were infectious intestinal diseases and pneumonia and influenza, which together represented 18.3% of the total deaths reported. The same causes in 2004 represented only 3.9% (25). Table 1 shows the 10 specific leading causes of death for 2004, with diabetes as the leading cause of death, which represented about 13% of the total number of deaths and a specific mortality rate of 59.0 per 100,000 population. There are no significant changes among the leading causes of death in the last 5 years, although the burden of death due to diabetes continues to rise, representing 10.7% of all deaths and with a rate of 46.3 per 100,000 population in 2000. Underreporting of death was estimated to be 0.8% for the 2000–2005 period (26).

Communicable diseases, maternal conditions, perinatal conditions, and nutritional conditions were the four largest groups of mortality causes, representing 26% of deaths in 1990, compared to 13.4% in 2004; noncommunicable diseases caused 57.8% of deaths in 1990 and 73.8% in 2004; external causes represented 13.9% in 1990 and 10.8% in 2004; and ill-defined causes accounted for 2.3% in 1990 and 2% in 2004 (25). Table 2 shows the causes of mortality according to PAHO's 6/67 list for 2003 (27).

## HEALTH OF POPULATION GROUPS

### Children under 5 Years Old

Infant mortality was 36.2 per 1,000 live births in 1990, 23.3 in 2000, and 19.7 in 2004. If this trend is maintained, Mexico will achieve the MDG goal of reducing infant mortality by two-thirds by 2015. The infant mortality rates show inequalities among the states: in 2004, the extremes were found in Chiapas (26.3 per 1,000 live births) and the Federal District (14.4 per 1,000 live births) (22). Seventy percent of infant deaths were due to perinatal conditions or congenital malformations, with a decrease in infectious causes such as diarrhea and respiratory infections (28). Acute lower respiratory infections represented the leading cause of death among children 1 to 4 years (10.3% of the total) with a rate of 8.4 per 100,000 population. The fourth cause of death was motor-vehicle accidents (29). Mortality among children less than 5 years dropped from 44.2 per 1,000 live births in 1990 to 24.0

**TABLE 1. Ten leading causes of general mortality, Mexico, 2004 compared to rate in 2000.**

ICD-10 code	Description	Deaths	%	Rate <sup>a</sup>	Rate in 2000
A00–Y98	Total	472,273	100.0	448.3	433.0
E10–E14	Diabetes mellitus	62,201	13.2	59.0	46.3
I20–I25	Ischemic heart disease	50,461	10.7	47.9	43.5
I60–I69	Cerebrovascular disease	26,975	5.7	25.6	25.2
K70, K72.1, K73, K74, K76	Cirrhosis and other chronic liver disease	26,867	5.7	25.5	25.2
J40–J44, J67	Chronic obstructive pulmonary disease	18,806	4.0	17.9	15.8
P00–P96	Certain conditions arising during the perinatal period	16,501	3.5	15.7	19.3
	Motor vehicle traffic accidents	14,312	3.0	13.6	13.7
J10–J18, J20–J22	Acute lower respiratory infections	14,215	3.0	13.5	14.3
I10–I15	Hypertensive diseases	12,203	2.6	11.6	9.7
N00–N19	Nephritis and nephrosis	10,774	2.3	10.2	9.7

<sup>a</sup>Rate per 100,000 population.

**Source:** General Directorate of Information of the Mexican Secretariat of Health.

**TABLE 2. Causes of death, according to PAHO's 6/67 list, Mexico, 2003.**

Group of 6/67 causes	ICD-10 code	Total	Standardized rate <sup>a</sup>
All causes	A00–Y89	470,692	630.4
Signs, symptoms, and ill-defined conditions	R00–R99	9,941	12.6
Communicable diseases	A00–B99, G00–G03, J00–J22	33,289	48.4
Tumors	C00–D48	62,891	82.9
Circulatory system illnesses	I00–I99	107,570	143.6
Certain illnesses originating in the perinatal period	P00–P96	17,081	35.7
External causes	V01–Y89	51,712	35.7
All other	Rest of D50–Q99	188,208	256.7

<sup>a</sup>Rate per 100,000 population.

per 1,000 live births in 2004. If this trend continues, Mexico will achieve the fourth MDG by 2015. However, the work is more difficult given that the sustained decline over the past decade is due to the infectious disease control strategies. For example, 30% of the deaths in children 5 years and younger in 1990 were due to diarrhea and acute respiratory infections, which in 2004 accounted for 15% (28).

Between 1990 and 2003, the rate of acute diarrheal disease in children less than 5 years dropped almost 84% (from 155.1 to 24.9 per 100,000 population), while in the case of acute respiratory infections, the reduction was slightly greater than 70% (from 142.9 to 42.0 per 100,000 population). The 2000 National Health Survey showed the prevalence of diarrhea (at least one episode of diarrhea in the last 2 weeks) in children less than 5 years to be 11.5%, and the 2006 survey showed an increase to 12.9%. At the national level the variation goes from 5.9% in Zacatecas to 21.1% in Chiapas (30). The same survey in 2006 found that 92% of children less than 1 year had been breast-fed some period of time

and that exclusive breast-feeding among infants less than 6 months old was 20%.

### Children 5–9 Years Old

In 2004, the mortality rate for children aged 5–9 years was 3.4 per 100,000 population. The leading causes of death were accidents, followed by malignant tumors, congenital malformations, deformities and chromosomal anomalies, cerebral palsy, violence and homicides, other infectious diseases, and malnutrition (31). The leading causes of morbidity were infections of the respiratory system, intestines, and urinary tract; otitis media (middle ear infection); gastrointestinal amebiasis; chickenpox; parasitosis; asthma; and tonsillitis (32).

### Adolescents 10–14 and 15–19 Years Old

In the 10- to 14-year-old age group, the leading cause of death in 2004 was motor-vehicle accidents (14.6% of the total number of

deaths), with an age-specific rate of 4.64 per 100,000 population. Among this age group, the number of suicides has risen, with suicides being the 10th leading cause of death in 2000 with a rate of 0.98 per 100,000 population and the 8th leading cause in 2004 with a rate of 1.33 per 100,000 population (33). Traffic accidents involving a motor vehicle were the leading cause of death for adolescents aged 15–19 years, representing 20% of all deaths and a rate of 13.9 per 100,000. In second place were homicides, with 10.6% of all deaths and with a rate of 7.2 per 100,000. For the combined age group of 10–19 years, the mortality rate for traffic accidents involving a motor vehicle grew from 8.62 per 100,000 population in 2000 to 9.24 per 100,000 population in 2004. Among the same group in 2004, homicides and suicides represented the third and fourth leading causes of death, respectively, with mortality rates of 4.22 and 3.12 per 100,000 population. In 2000, the mortality rate due to homicides among youth 10–19 years was 5.41 per 100,000 population and 2.69 for suicides. The male:female ratio for this age group in 2004 for homicides was 4:1, and for suicides was 2.5:1 (33).

Between 2000 and 2004, the average age at sexual debut was 15.4 years: 13.8 years in rural areas and 16.7 years in urban areas. In 2000, 372,000 pregnancies were registered among mothers between 10 and 19 years (17.2% of the total number of births), and 10% ended in abortion. The specific fertility rate for this age group was 70.1 per 1,000 women. According to the 2006 National Health Survey, 29.6% of adolescents between 16 and 19 years reported having had sexual relations, and 63.5% of adolescent males reported using a condom while only 38% of adolescent females reported that their partner used a condom.

### Adults 20–59 Years Old

In 1990, the maternal mortality rate was 89 per 100,000 live births; 72.6 in 2000; 62.4 in 2004; and 63.3 in 2005. Over the last 5 years the maternal mortality rate has not continued its downward trend but has been relatively stable, which is not enough to achieve the goal of 22.3 per 100,000 live births by 2015, which is the 5th MDG (34). Approximately 75% of all maternal mortality was concentrated in 12 federal entities. In 2004, the state with the highest maternal mortality rate was Guerrero, with 116.4 per 100,000 live births, and the lowest was Nuevo León with 13.1 per 100,000 live births (22). In 2003, the Secretariat of Health (SSA), through the General Directorate of Information, began a review to improve underreporting and identified areas with the highest maternal mortality, linked to areas historically known for having poor indigenous populations with little access to health services. In these regions, close to 20% of births are overseen by traditional birth attendants. In the areas of greatest economic development, maternal deaths are largely due to indirect causes and preexisting health conditions of the mother, while in the southern states many of the maternal causes are preventable, such as hemorrhages and toxemias. In 2004, 25% of maternal deaths were due to hemor-

rhages, 30% to hypertension, 6% to complications related to abortion, and 12% to other complications during birth (28). The average age of maternal mortality was 29 years. Only 33% of the maternal deaths occurred in women with some type of insurance, largely social security. Approximately 87% of births occur in a health institution, and 10% still occur at home (35). According to data from the National Commission on Indigenous Peoples (CNPI), maternal mortality is three times higher in the regions of Tarahumara, Huichola, and Cora than in the rest of the country and is largely linked to high levels of malnutrition.

The 2006 National Health and Nutrition Survey found anemia in 20.6% of pregnant women, compared to 15.5% among non-pregnant women, a situation that has improved since the 1999 survey, which found values of 26.2% and 20.0%, respectively.

According to CONAPO, about 600,000 births are registered annually for women between the ages of 20 and 24 and about 300,000 in adolescents between 15 and 19 years of age, resulting in 45% of all births occurring in women between 15 and 24 years of age. Twenty-two percent of maternal deaths are found in women 20–24 years, and 13% of maternal deaths are found in females 15–19 years (36).

### Older Adults 60 Years Old and Older

The average annual increase in the number of older adults (60 years and older) is about 270,000 persons. The principal causes of death in 2000 were cardiovascular disease for both sexes (30% of the deaths in men and 33.8% in women); the second leading cause of death among men was malignant neoplasms (14.6%) and in women it was diabetes mellitus (15.7%). In men, diabetes mellitus was the third leading cause of death (11.6%) and malignant neoplasms was third for women (13.4%). Digestive diseases were the fourth cause of death for both sexes (10.2% and 7.7% for men and women, respectively). The fifth cause of death was respiratory infections (7.7% in men and 5.9% in women). Table 3 shows the 10 leading causes of death for adults older than 65 years during 2004, as well as their rates during 2000, for comparison.

### The Family

Between 20% and 22% of households are headed by women (37). The number of domestic units headed by women is 4.6 million, up from 2.8 million in 1990. One important fact to consider about female-headed households is that half are low income, which often contributes to the incorporation of minors in economic activities. Female heads of household frequently are the only adult in the household, which requires them to assume the role of provider as well as the responsibilities of caring for and raising children and other domestic responsibilities, which leaves them overworked. Female heads of household are generally widows (35.9%), separated (24.7%), or divorced (18.4%). This type of household is generally composed of 3.6 people and in half the

**TABLE 3. Leading causes of mortality in people 65 years and older, Mexico, 2004 compared to the rate in 2000.**

ICD-10 code	Description	Deaths	%	Rate <sup>a</sup>	Rate 2000
A00–Y98	Total	249,267	100.0	4,595.1	4,619.1
I20–I25	Ischemic heart disease	37,509	15.0	691.5	686.9
E10–E14	Diabetes mellitus	37,380	15.0	689.1	587.1
I60–I69	Cerebrovascular disease	20,327	8.2	374.7	404.5
J40–J44, J67	Chronic obstructive pulmonary disease	16,514	6.6	304.4	295.2
I10–I15	Hypertensive disease	9,521	3.8	175.5	156.7
K70, K72.1, K73, K74, K76	Cirrhosis and other chronic liver diseases	8,966	3.6	165.3	164.6
J10–J18, J20–J22	Acute lower respiratory infections	8,161	3.3	150.4	161.5
N00–N19	Nephritis and nephrosis	6,323	2.5	116.6	120.5
E40–E46	Protein energy malnutrition	6,136	2.5	113.1	133.6
C33–C34	Malignant tumor, lungs, trachea	4,653	1.9	85.8	87.8

<sup>a</sup>Rate per 100,000 population.

**Source:** General Directorate of Information of the Mexican Secretariat of Health.

cases a minor below 15 years of age is present. Single-person households have increased significantly in recent decades and represent almost 1.5 million households (38).

The most recent national survey revealed that 25% of women have suffered some form of abuse (39). In Guadalajara, the prevalence of violence against women reached 57% in the urban area and 44% in the rural area. The rate of mortality due to homicide against women in 2002 was 2.5 per 100,000 women (40).

### Workers

Adolescents form an important part of the economically active population. In 2000, working males below 19 years of age represented 44% of the total number of men; in the case of females, 24%. The rate of participation in the labor force varied according to age; however, 8% of all adolescents 12 to 14 years are already in the workforce.

The Mexican Institute for Social Security (IMSS) provides services to 370,000 people annually due to workplace accidents (41). The risk of workplace accidents has improved, considering that between 2000 and 2005 the rate dropped from 2.9% to 2.3%. In the same way, permanent disabilities have dropped to 6.8%, and fatal workplace accidents to 3.1% (42).

### Persons with Disabilities

The population and housing census in 2000 identified 2.2 million persons living with some type of disability, largely related to reduced movement, blindness or visual impairments, mental disabilities, and lastly auditory and language problems. Slightly fewer than half of the total number of disabled people are older adults. The principal causes of disability are previous illness, followed by advanced age, congenital problems, and injuries or accidents (15).

### Ethnic Groups

In absolute terms, Mexico has the largest indigenous population in the Americas, estimated in 2006 to be 13,528,579 persons, which represents 12.6% of the total population. Mexico defines the indigenous population as persons older than 5 years of age who speak an indigenous language, the population 0 to 4 years of age who live in households whose head is an indigenous language speaker (ILS), and the population who self-describe as indigenous (15).

In Mexico, 62 indigenous languages exist, with 30 dialectical variations. One-quarter of the indigenous people speak Náhuatl, followed by Maya, Otomí, Tzeltal, Tzotzil, among others. However, 17 of the 62 indigenous languages have a diminishing number of speakers, and reproduction problems leave them with fewer than 500 ILS. The Mexican states with the greatest proportion of indigenous population are: Yucatán (60%), Oaxaca (49%), Quintana Roo (40%), and Chiapas (29%), all of which are located in the southern part of the country.

According to CONAPO estimates, infant mortality in the indigenous population was 34.4 per 1,000 live births in 2000 and 26.8 per 1,000 live births in 2006. The risk of dying due to pregnancy, birth, and peripartum causes is three times higher in indigenous women (43). The illiteracy rate among indigenous peoples is 44%, while the national level is 10% (44). The prevalence of childhood malnutrition is 58.3% in indigenous children, and iron deficiency among pregnant indigenous women is 60% (44). In Oaxaca, the number of physicians per 1,000 indigenous population is 0.13, compared to the state average of 0.94, and a national average of 1.38 physicians per 1,000 population.

The indigenous population is predominantly found in rural areas. Sixty-five percent reside in localities with fewer than 2,500 persons where the historical factors of poverty, marginalization, and social exclusion persist. Of the 871 municipalities considered indigenous, 259 (29.7%) qualify as being very highly marginalized and 363 (41.7%) are highly marginalized (45). In 2000, 36% of indigenous housing did not have piped water and 16.9% did

not have electricity, while 43.7% had dirt floors and 62.4% cooked with firewood (15).

Despite the development of a health information system, it has not been possible to incorporate ethnic variables into the registries. However, gaps and vulnerabilities in matters of health among the indigenous population are recognized, in which communicable diseases, severe malnutrition, the presence of preventable diseases, as well as problems such as alcoholism, accidents, and violence persist (46).

### Border Populations

The border between the U.S.A. and Mexico is 3,152 kilometers long. Migration to the United States has historically been attractive to the Mexican population, as well as Central Americans, generating a complex social situation on the northern and southern borders. In 2005, 516 migrants died trying to cross the northern border, the greatest number registered in the last 10 years (47). A mix of chronic and infectious diseases, including tuberculosis, hepatitis, and HIV/AIDS, are found in this population, with higher incidences than the national averages (48). The increase in the number of injection drug users (IDU) among younger users, particularly women, is worrisome and carries with it a higher risk of sexually transmitted infections (49).

The southern border is 1,138 kilometers and is shared with Guatemala and Belize. Chiapas is the state that shares historical, cultural, ethnic, and environmental links with the border region of Guatemala. It is estimated that the annual number of illegal migrants who cross the border is 120,000 persons, complicating epidemiological surveillance with the possibility of introducing a new agent of disease or resistant forms of known diseases.

## HEALTH CONDITIONS AND PROBLEMS

### COMMUNICABLE DISEASES

#### Vector-borne Diseases

More than 99% of the cases of **malaria** are caused by *Plasmodium vivax*, and only a few, registered in the border states of Tabasco and Chiapas, are due to *P. falciparum*. The principal vectors are *Anopheles pseudopunctipennis* and *An. albimanus*. In 2005, 2,967 cases were reported, representing a reduction of 13% from 2004 (3,406 cases) and down 60% from 2000 (7,390 cases). In 2005, 97% of the transmission was concentrated in the states of Oaxaca (1,432), Chiapas (852), Sinaloa (208), Chihuahua (181), Durango (114), and Tabasco (97). DDT use has been discontinued and the insecticide is no longer being produced; household spraying with insecticides has also been eliminated, as community participation has increased to control vector breeding grounds.

In the 26 federal entities (629 municipalities and 43 million inhabitants), risk factors for the transmission of **dengue** persist.

In 2005, 17,487 cases of classic dengue were registered, with a rate of 16.43 per 100,000 population, a 10-fold increase over 2000, when 1,714 cases were recorded. In 2002, the predominant serotype was DENV-2 (dengue virus type 2), and in 2005, for the first time in 5 years, outbreaks of more than one serotype were registered, which increased the cases of hemorrhagic dengue from 67 in 2000 to 4,418 in 2005. Fatalities have remained at less than 1%. In the last 2 years, four serotypes have been found, which is largely due to the reintroduction of the DENV-1 and DENV-4 dengue virus strains from Central America.

Ecologically favorable conditions for proliferation of the triatomine vectors for **Chagas' disease** exist, and 30 species have been described, among which 10 are epidemiologically important. In 2000, 100 cases were registered, 17 acute and 83 chronic, and in 2005, 361 cases were registered, 14 acute and 347 chronic (17 with cardiopathy, 1 with megacolon, and 329 undetermined).

The transmission of **leishmaniasis** has been linked to five possible species—*Lutzomia olmeca*, *L. cruciata*, *L. diabolica*, *L. shannoni*, and *L. longipalpis*—which vary in importance based on geographic location and endemic area, the species of the transmitting parasite, and the clinical type of illness with which it has been associated. The localized cutaneous form is found most frequently (99%); disseminated cutaneous and mucocutaneous leishmaniasis are responsive to treatment in most cases. The visceral form has been reported annually in the State of Chiapas since 1990 and occasionally in other states. In 2000, 797 cases were reported; in 2005, 868 new cases were reported, for an increase of 9% (50).

**Trachoma** continues to be endemic in five indigenous municipalities of Los Altos-Chiapas. Since 2001, the SSA and other state, national, and civil society organizations have given special emphasis to the Program for Surveillance, Prevention and Control of Trachoma, which has established strategies such as the active search for cases, house by house, social mobilization, and health education, which have permitted the certification process of the elimination of trachoma to begin. The municipality of Oxchuc is the most affected, with more than 50% of the total cases, but the highest prevalence of active trachoma is in the municipality of Tenejapa, with 79 cases.

#### Vaccine-preventable Diseases

As a result of vaccination campaigns, poliomyelitis, diphtheria, and neonatal tetanus remain eliminated. The last case of diphtheria was found in 1991, and the last case of poliomyelitis was found in 1990. Other illnesses such as measles, whooping cough, mumps, and rubella are also under control. The vaccination schedule consists of 11 immunobiologics: BCG (antituberculosis) at birth; OPV (oral antipoliomyelitis) at 2, 4, and 6 months; pentavalent (DPT-HB-Hib) at 2, 4, and 6 months; MMR (measles, mumps, and rubella) at 12 months. Since 2004, a dosage of flu vaccine for children 6 and 24 months old has been incorporated. For adolescents, a second dose of MR (measles and rubella), as well as TD

(tetanus and diphtheria toxoid), is given, and for adults 65 years and older, an annual influenza vaccine is given. Since 2000, the coverage of the basic vaccination schedule for children less than 1 year has been maintained at greater than 95%, and in children aged 1–4, coverage is greater than 96%. The vaccination coverage has been achieved through a combination of two strategies: constant vaccination promotion and intensive phases during the national health weeks, which are conducted three times a year.

Mexico maintains active surveillance of acute flaccid paralysis, and between 2000 and 2005 identified on average 420 cases annually. The last case of autochthonous or native measles was reported in 1996, but in 2000 the first reintroduction of the virus occurred with 30 cases registered in four states. During 2001 and 2002, no cases were confirmed, but in 2003, 44 cases of measles were reported, followed by 64 in 2004, and 6 in 2005. The isolated viral genotypes in this outbreak indicated that the virus came from other continents.

In 2000, 11,751 cases of **rubella** were identified, which dropped to 38 cases in 2005. There were five cases of congenital rubella reported in 2000, and in 2005 only one case was identified. Mumps dropped from 27,911 cases in 2000 to 8,425 in 2004 (reduction of 30%). Both diseases were reduced significantly due to the introduction of the triple viral vaccine (MMR) in 1998 as part of the national vaccination schedule.

In 2000, 53 cases of **whooping cough** were reported, 137 in 2004, and 349 in 2005. Tetanus cases dropped from 103 in 2000 to 71 in 2005. In 2000, 119 cases of meningial tuberculosis were identified, 147 in 2004, and 199 in 2005.

After the incorporation of the vaccination against *Haemophilus influenzae* type b in 1999, the number of cases dropped from 131 in 2000, to 56 in 2004, and to 39 in 2005. After introduction of the vaccine against **hepatitis B** in 1997, the number of reported cases dropped from 835 in 2000 to 687 in 2004; all national blood banks screen blood for hepatitis B.

### Intestinal Infectious Diseases

Between 2000 and 2004, the most common food-borne illnesses were paratyphoid (with an average annual incidence of 93 cases per 100,000 population) and **shigellosis** (which dropped from 36.51 cases per 100,000 population in 2000 to 21.19 cases in 2004). The incidence of other intestinal infections also dropped with 5,203 cases per 100,000 in 2000 and 4,535 per 100,000 population in 2004.

### Chronic Communicable Diseases

The number of reported case of **respiratory tuberculosis** has been stable, with an average of 12,372 annual cases over the period 2000 to 2004. The cumulative annual incidence of all forms of tuberculosis between 2000 and 2004 was 15 per 100,000 population, with some 16,000 cases reported per year and more than 3,000 deaths annually. The greatest areas of risk are the states of Baja California, Chiapas, Nuevo León, Tamaulipas, and Veracruz,

where more than 40% of the national cases are found. The pulmonary form of the illness was found in 80% of the deaths reported for the period 2000–2004. The incidence of meningial tuberculosis was 0.12 per 100,000 population in 2000, and 0.14 in 2004. The treatment strategy of direct observation (DOTS) is utilized in more than 80% of diagnosed cases. The association of tuberculosis with other types of health conditions such as diabetes, malnutrition, alcoholism, and HIV/AIDS increased from 2000 to 2004.

**Leprosy** does not constitute a public health problem in most Mexican states. In 2000, the incidence was 0.42 per 100,000 population, and 0.24 in 2004 when 252 new cases in 26 states were detected, but with 77% of the cases concentrated in the states of Colima, Guanajuato, Guerrero, Jalisco, Michoacán, Nayarit, Nuevo León, Sinaloa, and Tamaulipas.

### Acute Respiratory Infections

Doctor's visits for acute respiratory illnesses dropped from 29,427 per 100,000 population in 2000 to 24,581 in 2004. The cumulative incidence of pneumonia and bronchitis dropped from 204 to 172 per 100,000 population during the same period, and the incidence of influenza dropped dramatically from 0.57 to 0.06 per 100,000 population. Ninety percent of the cases were found in people younger than 44 years, and children aged 5 to 14 years were the most-affected age group. The mortality rate from respiratory illnesses, including pneumonia and influenza, in children less than 5 dropped from 51.6 deaths per 100,000 in 2000 to 35.3 per 100,000 in 2004.

### HIV/AIDS and Other Sexually Transmitted Infections

The HIV/AIDS epidemic began in Mexico in 1983 and grew exponentially until 1994, when it stabilized. Up until November 2005, the cumulative number of AIDS cases was 98,933, with a male:female ratio of 5:1. The 2006 estimates indicate 182,000 persons living with HIV/AIDS, of which close to 45,000 are women (male:female ratio of 3:1). In the population aged 15–49, the prevalence is estimated to be 0.3%. However, among specific at-risk groups the prevalence varies: 15% among men who have sex with men, 3.5% in female sex workers, 20% in male sex workers, 6% in intravenous drug users, and 4% in prisoners (51). Between 1985 and 2005, 741 cases of AIDS were found in adolescents between the ages of 12 and 17 years (52).

An increase in the growth of the epidemic has been seen in the northern border states, due to the increase in the population of intravenous drug users, as much among men as among women (53). The situation has become more serious due to the convergence of mobile populations, particularly indigenous groups. In 2004, 4,723 deaths due to HIV/AIDS were registered, representing the 16th leading cause of death in the population as a whole, with a mortality rate of 4.5 per 100,000 population, and the 7th cause of death nationally in the population 15–64 years (54). The highest rate of mortality due to AIDS in 2004 was found in the

State of Baja California (9.8 per 100,000 population) and the lowest was in Querétaro (1.7 per 100,000 population). Mortality in Mexico began to drop after access to treatment with antiretrovirals (ARVs) began in 1997 through social security. In 1999, the SSA began giving access to ARVs to the uninsured population, achieving universal access to all registered HIV/AIDS patients in 2003, covering 25,082 persons. The 2005 estimates confirm that more than 30,000 persons living with HIV/AIDS are receiving free treatment through the Mexican health system (51). Among other prevention activities, an anti-homophobia campaign began in 2005 through national radio spots. This campaign, supported by UNAIDS, seeks to reduce the stigma and discrimination suffered by gay men, which limits their access to health services and their adherence to therapy. Only 5.4% of pregnant women are tested for HIV (55), and the prevention of vertical transmission is not widespread.

In 2004, 10,403 cases of the human papillomavirus were recorded, which represents a rate of 9.8 per 100,000 population, with the highest rate in the State of Nayarit (60.4 per 100,000 population). Five hundred ninety-five cases of gonorrhea were registered, 990 cases of syphilis, 48 cases of congenital syphilis, and 245 cases of soft chancre (56).

### Zoonoses

Mexico is free of **bovine spongiform encephalopathy**; however, surveillance remains active throughout the country. From 1996 to 2005, a total of 9,903 animals were tested. A restrictive policy is maintained with countries affected by this disease, with a control on importations through a required animal health form. The country has been free of **foot-and-mouth disease** since 1954. A Binational Commission with the U.S.A. oversees a high-security laboratory for the surveillance and prevention of this and other diseases. From 2003 to 2005, more than 1,134 samples were examined through the disease monitoring and surveillance process.

Between 2000 and 2005, 20 deaths from human rabies were identified, 2 of which were transmitted from dog bites, with the rest from wild animals. In 2000, 244 rabid dogs were reported; in 2004, only 42 cases of rabies were identified. The canine anti-rabies vaccine increased from 13.7 million doses in 2000 to more than 16 million in 2005.

The incidence of brucellosis was stable over the period 2000 to 2004, with an incidence of 2.18 to 2.98 human cases per 100,000 population. The states with the highest number of notifications were Coahuila, Nuevo León, Sinaloa, and Zacatecas, and the principal sources of infections were contaminated milk and milk products, largely from goats. The number of cases of teniasis has dropped and the incidence of this illness in 2004 was 0.37 per 100,000 population, while cysticercosis in humans has remained stable, with an incidence that same year of 0.39 per 100,000 population; for both diseases, most cases were found in the southern states.

Approximately 6.5 million people each year are infected by some infectious agent or parasite (57), and it is estimated that two-thirds of them are due to food-borne diseases, which results in more than 4 million cases.

Different species of scorpions are found throughout the country. The lethal species are found principally in the states in the central part of the country and the Pacific coast. In 2000, 208,444 scorpion stings were reported, which represents an incidence of 209.3 cases per 100,000 population, and in 2005 247,976 cases were reported, with a rate of 232.9. This increase is due to improvement in case notification (58).

In November 2002, the first case of **West Nile virus** (WNV) was confirmed in Mexico, when seropositive horses were found in the two northern border states of Tamaulipas and Coahuila. Since then, epidemiological surveillance has been strengthened and resulted in confirmation of the presence of WNV in 30 states and 141 municipalities in 2004. During 2005, the presence of WNV was found in 28 states and 135 municipalities; 236 suspected cases were studied in humans, but all were negative. Positive blood tests were reported for 931 horses and 152 birds (59).

## NONCOMMUNICABLE DISEASES

### Metabolic and Nutritional Diseases

Chronic malnutrition in children less than 5 years dropped from 17.7% in 1999 to 12.7% in 2006; moderate malnutrition dropped from 7.5% to 5%; and emaciation dropped from 2% to 1.6%. For the same period, the prevalence of low-height (for age) in children 5 to 11 years dropped from 16.1% to 10.4% for boys and 16.0% to 9.5% for girls. However, overweight and obesity among children aged 5 to 11 years increased from 18.6% in 1999 (20.2% in girls and 17.0% in boys) to 26% in 2006 (26.8% in girls and 25.9% in boys). By 2006, one of three adolescents was considered **overweight** or obese, and 37.4% of women over 20 years of age were overweight and 34.5% were obese (for a total of 71.9%). Among men older than 20 years, 42.5% were overweight and another 24.2% were obese (30). In the population 20–49 years, according to health and nutrition surveys from 1988, 1999, and 2006, the prevalence of overweight and obesity was 34.5%, 61.0%, and 69.3%, respectively. The increase is considered a result of changes in food consumption and lifestyle that are causing serious health problems.

The 2006 National Health and Nutrition Survey estimated that 23.7% of preschoolers, 16.6% of school-aged children, and 11.5% of adolescents have **anemia**.

The prevalence of diabetes is estimated to be 7.5% nationally in persons older than 20 years: 2.8 million Mexicans have been diagnosed as diabetics, and close to 820,000 persons are believed to be diabetic without knowing it (60). There is a greater prevalence among women aged 50 and older. The prevalence of diabetes increases with age, and it is estimated that one quarter of

70- to 77-year-olds are diabetic. There is a greater prevalence of diabetes in the northern states. Diabetes is the leading cause of death among women and the second leading cause among men, consuming a significant portion of resources for health.

### Cardiovascular Diseases

The incidence of cardiovascular diseases increased from 2000 to 2004, largely caused by arterial hypertension, which increased from 401 to 529 per 100,000 population, with a total of 558,139 new cases in 2004. The incidence of ischemic heart diseases grew from 60 per 100,000 population in 2000 to 62 per 100,000 population in 2004. The group most affected was those 65 years and older. Mortality due to heart disease grew over this period, largely caused by circulatory system diseases and ischemic heart diseases. The mortality rate in 2000 from circulatory system diseases was 96.6 per 100,000 population, while in 2004 it was 102.1, and the mortality rate due to ischemic heart disease increased from 43.5 to 48 per 100,000 population. The federal entities most affected were Sonora, Chihuahua, Nuevo León, and the Federal District.

### Malignant Neoplasms

In 2000, the mortality rate from neoplasms of all types was 57.1 per 100,000 population, which grew in 2004 to 61.0 per 100,000. Mortality was higher among men than women throughout this period. The tumors with the highest rates of mortality during this period were found in the trachea, bronchial tubes and lungs, stomach, uterus, prostate, and breast (61).

In 2002, the observed rate of cervical-uterine cancer was 20 per 100,000 for women 25 years and older. Despite the decrease in this rate, this type of cancer remains the leading cause of death for this age group. Women who live in indigenous areas have a 30% greater probability of dying from this cause. The mortality rate from breast cancer in 2002 was 17.74 per 100,000 women 25 years and older, and it constitutes the second leading cause of death for this age group (35).

## OTHER HEALTH PROBLEMS OR ISSUES

### Disasters

Due to its geographical location, as well as its size, Mexico faces natural phenomena such as hurricanes on both the Atlantic and Pacific sides, volcanic activity, earthquakes, cold fronts and heat waves, intense rains, floods, landslides, and forest fires. PAHO's Emergency and Disaster Prevention Program, with information received from Mexican health authorities during 2000–2005, recorded 57 events classified as disasters. Of those events, 72% were classified as natural, and 28% were classified as man-made. The natural disasters included: 14 floods, 7 hurricanes, 8 tropical storms, 4 heat waves, 3 droughts, 2 earthquakes, 2 volcanic eruptions, and 1 landslide. Man-made disasters were: 11

traffic accidents involving transport of dangerous substances, 3 accidents involving miscellaneous explosives and environmental fires caused by man, and 2 industrial accidents. The total number of persons affected by these events was 3,396,106, with 303,800 homes lost and 1,655 injured persons. From 2000–2005, 885 deaths were reported.

In January 2003, an earthquake measuring 7.6 on the Richter scale occurred in Colima that left more than 2,000 homes unsafe, according to experts. These earthquakes are frequent due to the interaction between the Rivera and Cocos plates (62). September 2005 marked the 20th anniversary of the Mexico City earthquake that killed more than 10,000 persons, despite the valiant efforts of the health system. Multiple academic and public efforts were carried out, showing the city's achievements in civil protection. In 2005 alone, the estimated number of hurricanes exceeded the national average of seven tropical storms, with eight total (seven on the Atlantic and one on the Pacific). This was considered one of the most intense years of hurricane activity, affecting the southern states as well as those close to the Gulf of Mexico. Hurricanes Stan and Wilma, among other natural disasters, brought economic loss, displacement of the population, collapse of physical infrastructure, risks of vector-borne diseases, impact on tourism, and damage to agriculture and livestock, which particularly affected the indigenous communities in the Gulf region.

### Violence

Discrimination and violence against women persist in Mexico, even resulting in death. Many cases of death among women are unresolved in the judicial system and remain unpunished. Between 1993 and May of 2006, 430 homicides of women in the city of Juarez were documented, with more than 600 disappearances (63). Before being killed, these women were kidnapped, beaten, and raped. Migrant and indigenous girls and adolescents are victims of physical, social, and mental abuse. The need for greater efforts to preserve the rights of women and achieve gender equity in education, salary, and political participation is recognized as necessary to achieve MDG 3.

### Addictions

In 2003, the Youth Tobacco Survey indicated that about half of students (51.1%) have experimented or tried cigarettes at some time. One in five students is an actual smoker, with no statistical differences between males (19.6%) and females (19.1%). Among nonsmokers, the rate of susceptibility to start smoking is 25.2%. In secondary schools, the most frequently used drugs are inhalables (4%), followed by marijuana (2.8%), tranquilizers (2.8%), and cocaine (2.5%). Among those between the ages of 12 and 17, 15.1% of males and 5% of females consume alcohol at least once a week (1). It is estimated that 32 million people between the ages of 12 and 65 years consume alcohol, with a per capita annual consumption of 2.8 liters, and an average of 4.5 liters among men between the ages of 18 and 65 years, with growing consumption

## The Demographic Bonus: Associated Challenges

With about 100 million inhabitants, Mexico ranks today as the 11th most populated country on the planet and is expected to maintain that position for several decades more. It is estimated that between 2005 and 2025, due to the sustained decrease in the fertility rate, the population replacement rate will be maintained (each couple has the number of children needed to replace them in the population pyramid), but will decline to 1.85 children per women by 2025. Consequently, the demographic transition will change the population pyramid, which will have more individuals of productive age and older adults. Between 2005 and 2025, Mexico will experience a “demographic bonus,” where a beneficial relationship will exist between the working age population (15–59) and the dependent population (children under 15 and adults over 60). Given the lesser burden of the dependent population on Mexican families, this period will be an opportunity to favor development policies, job creation, and the formation of social and human capital and, above all, to reduce disparities. However, the benefits of the “demographic bonus” are not automatic. To capitalize on them, Mexico needs to educate young generations in order to develop a better-qualified workforce, invest in or attract investments that generate more and better jobs, and provide a minimum of economic security for older adults. The period will also be marked by an increase in demand for health services and social security, as well as housing. The challenge of providing assistance for the elderly is large since the number of older adults in Mexico (60 years and over) is growing by an average of about 270,000 people each year.

among women (64). The 2006 National Health and Nutrition Survey showed that tobacco use among adolescents between 10 and 19 years old was 7.6%. In 16- to 19-year-olds, it was 25.9% among males and 9.5% among females (tobacco use is defined as smoking more than 100 cigarettes in the course of one’s life). Adult males smoke three times more than females, and an increase in the proportion of smokers has been seen since the 2000 Health Survey. Smokers in the 20- to 29-year-old age group increased from 8.4% to 10.7% and in the 50- to 59-year-old age group increased from 9.4% to 10.1% (30).

### Environmental Pollution

Nitrogenated products such as fertilizers are used in 5% of agricultural lands, and pesticides are used in 0.14% of lands. The rate of incidence of pesticide poisoning among industrial and rural workers over the period 2000–2003 increased from 0.3 to 0.4 per 10,000 workers.

The Program to Improve Air Quality of the Metropolitan Area of the Valley of Mexico (PROAIRE) 2002–2010 notes that the atmospheric contaminants of greatest importance for public health are ozone (O<sub>3</sub>) and particulate matter less than 10 micrometers (PM<sub>10</sub>). The concentrations of O<sub>3</sub> that were recorded in the Metropolitan Area of the Valley of Mexico (ZMVM) show a 42% decrease over the period 1990–2004, although in 2004, concentrations that exceeded the normal limits for health protection were reported in 6 of 10 days. The lead concentrations in particulates have decreased 94% since 1990, resulting in acceptable levels according to the norm since 1993 (65).

Mexico has a maritime coast of more than 5,000 kilometers and has more than 250 beaches. The result of bacterial quality

surveillance in 2005 shows that 17% of the beaches are not safe for recreational use. One-third of the territory is formed by forest or jungle, and 700,000 hectares are deforested each year, resulting, along with fires and change in use of the soil, in only 55% of original jungles being protected (66).

### Oral Health

The results of the National Cavity and Dental Fluorosis Survey (1997–2001), with a sample size of 123,293 schoolchildren, show a rate of DMFT (decayed, missing, or filled teeth) of less than 3 for those 12 years of age. The most common dental problems were caries (76%), filled teeth (20%), and lost teeth (1.6%). The prevalence of dental caries for 12-year-olds was 58%. The Epidemiological Surveillance of Oral Pathologies System (SIVEPAB) is working to help people be informed in a trustworthy and convenient way about their different oral health problems including the use of dental fluorosis.

## RESPONSE OF THE HEALTH SECTOR

### Health Policies and Plans

The 2001–2006 National Development Plan is the principal planning instrument for the federal government. The 2001–2006 National Health Program (PNS) is derived from the National Development Plan and is based on four main principles: 1) good health is one of the development goals and is necessary to achieve true equality in opportunity; 2) health, along with education, is the central component of human capital; 3) health has a strategic potential that should be considered as a social objective and

therefore health policies should be complemented with healthy policies; and 4) health protection is a value shared by all societies, all ideological systems, and all political organizations. Good health is a value that can strengthen the social fabric. The challenges the PNS proposes are to achieve equity, technical quality, and quality treatment and to establish a system of financial protection for health (43).

National health authorities have not developed a specific policy for cost containment and have focused sector resources on strengthening prevention programs, whose objective is to improve the quality of life of the population, such as the Even Start in Life (*Arranque Parejo en la Vida*) Program. The objective of this program is to provide care to boys and girls less than 2 years of age as well as women during pregnancy, childbirth, and postpartum periods, with the goal of combating maternal, neonatal, and infant mortality. The “Care for Pregnant Women” Program (AME) strengthens care to women during pregnancy, birth, and postpartum.

The provision of health services by the SSA was decentralized in two stages: the first during the 1980s and the second during the 1990s. Both processes came about as a response to the perception that the system was bureaucratic and centralized by design. Furthermore, they were developed because health policies resulted in an inefficient assignment of resources to the states and difficult coordination between providers of health services and the uninsured population. The decentralization resulted in a clearer division of responsibilities between federal and state authorities. The federal authorities are responsible for establishing the objectives for health care, defining a legal framework for general system functioning, and ensuring coordination, planning, and follow-up on results. The State Secretariats of Health (SESA) have ample operational flexibility and are responsible for determining the organization and operation of health services for the uninsured population. Coordination between the federal and state authorities is carried out through the National Health Council (CNS), which is made up of the secretaries of health of each state and is presided over by the federal secretary. The CNS has an important role in strengthening and achieving better coordination among the SESA (67).

The IMSS also decentralized its operations, and the reforms tended to transfer the daily administrative decisions to the health service providers, although administration and control of the system remain with the central authorities. The IMSS is divided into 35 delegations clustered into four regions, which are responsible for the strategic planning and control of activities (68).

The health system in Mexico is basically focused on two general laws carried out continuously by the state: the General Law of Health and the Social Security Law. The General Law of Health was reformed on January 1, 2004, to create the System for Social Protection in Health (SPSS) which offers access to health services to all uninsured Mexicans. Also in 2004, an agreement with the tobacco industry was signed to support the SPSS through the

Catastrophic Expense Fund. In 2002, the Federal Commission for the Protection Against Health Risks (COFEPRIS) was formed, which unified and homogenized health policy in this area with technical, administrative, and operational autonomy for the regulation, control, and development of sanitary practices in health establishments; availability of organs, tissues, human cells, and their components; availability of blood, medications, toxic or dangerous substances, narcotics, psychotropic drugs, biotech products, primary and additive materials, and establishments dedicated to processing or storing them; sources of ionizing radiation for medical use; harmful effects on human health from environmental factors; international health; and, in general, the required health conditions that cover the processes, products, methods, installations, services, or activities related to the materials described above (69).

### Health Strategies and Programs

The 2001–2006 National Health Program includes different efforts 1) to develop conditions and interventions to affect health determinants in an effective way, 2) to achieve better levels of health and well-being of the population, and 3) to support the incorporation of health into national development plans and programs. These goals are translated into 10 priorities that reflect the principal health strategies. They are (43): 1) link health with social and economic development; 2) reduce health risks that affect the poor; 3) combat emerging problems through explicit definition of priorities; 4) launch a crusade for quality in health services; 5) offer financial protection in matters of health to the entire population; 6) construct a cooperative federalism in the area of health; 7) strengthen the oversight role of the Secretariat of Health; 8) advance toward an Integrated Model of Health Care (MIDAS); 9) expand people’s participation and freedom of choice in primary health care; and 10) strengthen the investment in human resources, research, and health infrastructure.

The General Law of Health was approved on January 1, 2004, which provided the legal basis for the national System of Social Protection in Health (SPSS). The SPSS, rooted in Popular Insurance (“Seguro Popular”) as its fundamental operating mechanism, offers financial protection to those without social health insurance, incorporating it into a scheme with criteria for public insurance.

Popular Insurance coverage reached 1.6 million families in 2004. It is estimated that coverage grew in 2005 to 3.6 million families throughout the 32 states, or more than 12 million people. Within Popular Insurance, 40% of the affiliated families belong to the Opportunities Program, 75% are families headed by women, and 93% are exempt from paying. Popular Insurance provides 154 interventions or services based on the International Classification of Diseases (ICD). For 2005, SPSS had an initial budget of 8,595.7 million pesos (roughly US\$ 771 million), 86.5% greater in real terms than in the 2004 budget.

The System of Popular Social Security (SISSP), implemented by the National Council for Social Protection, began in February 2006 (70) and guarantees medical care services, pensions and retirement, and housing to the poorest and is considered a mechanism of equity to fight marginalization. The SISSP functions as an interagency body headed by the President of the Republic. This new system of social security offers beneficiaries a Retirement Savings System, through the Opportunities Program; subsidies for housing, authorized by the National Development Commission; and medical care provided by Popular Insurance.

### Organization of the Health System

The Mexican Health System is characterized by its fragmentation in financing as well as in access to health care services. This lack of institutional integration is the source of inequalities in the benefits the population receives, since the various providers receive different levels of payment and provide different levels of care at various levels of quality.

The public sector is characterized by the presence of various insurers and service providers integrated in a vertical fashion that care for different population types, maintain very little contact among them, and differ in the type of financing and organization of the provision of care; the latter is the cause of inefficiencies in the spending of public funds. Furthermore, the system includes a broad, lucrative private health care services sector; persons with the ability to pay can make use of services by paying for the services they receive (43).

In 2005, the social security institutions covered 55 million salaried workers in the formal sector, representing a decrease of 2.56% from 2000, due to a variation in the unemployment rate from 2.2% in 2000 to 3.75% in 2005. The IMSS is the largest insurer, with 44.5 million insured, followed by the Insurance and Social Service Institute for State Workers (ISSSTE), with 10.6 million. This is followed by *Petróleos Mexicanos* (PEMEX) with 700,000 insured persons and the Armed Forces, the Secretariat of the Navy, and various other insurers for state workers with 600,000. Additionally, the IMSS offers family health insurance for persons with the ability to pay who wish to purchase it through an annual quota payment.

Informal workers, the rural uninsured population, and the unemployed accounted for 45 million people in 2005. They received care from the SSA and the SESA, which oversee public hospitals and clinics. There are huge differences between the states in terms of their availability of per capita resources to provide health services, and there are access problems for those in rural areas.

Furthermore, private nonprofit institutions exist, such as the Mexican Red Cross and numerous nongovernmental organizations (NGOs), which provide medical care with little emphasis on primary health care but play an important role in issues such as HIV/AIDS and the sexual and reproductive health rights of women.

### Public Health Services

The principal strategy to address health, education, and nutrition problems in rural areas is the Opportunities Program, which includes comprehensive interventions to improve the health and nutrition of the family, with a special emphasis on vulnerable groups, and provides a special package of health services free of cost (71).

In a parallel way, the National Programs of Health, Environment, and Development conduct lines of work that converge in the promotion of sustainable development with healthier environments and the development of action plans that help overcome the risks and inequalities in this area.

Since 1999, the Mexican Toxicology Network (RETOMEX), which serves as the national registry for poisonings and epidemiological surveillance of environmental health risks, has functioned with the technical collaboration of PAHO/WHO. Better collaboration among national and state entities is required for its full consolidation.

Mexico has been active in various food markets around the globe, particularly with the United States and Canada, within the framework of the Free Trade Agreement (FTA). Efforts over recent years have been aimed at strengthening established norms and the interaction between the health and agriculture sectors to comprehensively address food safety requirements from primary production, through importation/exportation, to consumption, recognizing the need to increase production of clean food to satisfy consumer needs and to take advantage of the opportunities of the international market within the framework of commercial agreements signed by the country.

In the area of food safety, health norms tend to prioritize activity that contributes to the prevention and control of food-borne illnesses, including the production of safe foods. Given this, various federal agencies, state governments, and municipalities, as well as civil society organizations, work together to carry out various programs and activities largely focused on nutritional deficiencies and deficits in four principal areas: food production, promotion of better eating habits, nutritional surveillance, and the complementary provision of food and micronutrients for specific population groups. However, better collaboration between the developed programs and activities is needed by the institutions and the subnational governments; duplication and holes exist that need to be corrected to achieve greater efficiency and impact.

The MDG of reducing the number of homes without water by 50% has been achieved: access to piped water in homes or within the property increased from 75.4% in 1990 to 89.5% in 2004, but significant disparities exist among the states (70.5% in Guerrero and 98.7% in Veracruz, Aguascalientes), and, in rural areas, coverage reaches only 70.5% (72). Approximately 89.4% of the population has sewage and sanitation services, but important variations exist: in Guerrero only 64.7% have these services, while 99.6% in the Federal District have them. Ninety-five percent of the population have electricity and 14.5% have dirt floors in their

homes. The latter value reaches 40% in Chiapas, Oaxaca, and Guerrero (22).

In the case of preparedness for disasters, it was estimated that in 2006 there would be 30 hurricanes, five of which could be very intense. For this reason, 27,000 shelters were built and 30,000 guardsmen were made available at the national level. High levels of citizen participation demonstrate the maturity of the population and their civil protection institutions. All these phenomena are constantly monitored by the national system for civil protection. When the municipalities are affected by some sort of natural disaster that exceeds their response capability, the Natural Disaster Fund (FONDEM) is activated to address unforeseen effects (73).

In 2003, the National Committee for Health Security was created as the highest national entity to carry out prevention activities in epidemiological emergencies and disasters, including: those of a hospital-based nature; those resulting from bioterrorism; and those produced by natural disasters, infectious disease outbreaks, or outbreaks due to some other agent (74). The Directorate of Epidemiological Emergencies and Disasters of the SSA coordinates with all the institutions that participate in the response and mitigation of natural disasters (National System of Civil Protection, Social Security, Mexican Red Cross, United Nations agencies, bodies of the National Defense, and nongovernmental organizations).

The SSA, through the National Committee for Health Security, has established a national preparedness plan and response for pandemic influenza, whose principal objective is to maximally reduce the negative health impact on the population. The prevention plan ensures coordination between the different institutions of the country and at the state and jurisdictional levels, ensuring protection to health personnel so they can respond quickly and effectively. Given the eventuality of a pandemic, the epidemiological surveillance systems and the public health laboratory network are being strengthened; identification of priority population groups where vaccinations and antiviral medications would be concentrated is being conducted so that the purchase and strategic storage of medications and goods will be available. The plan is coordinated with the work plans of the other countries in the Region (75).

### Individual Care Services

The National Health System provides three levels of personal health services. The first level carries out activities that are focused on health promotion, prevention of disease, and ambulatory care to the ill and is largely provided by general physicians and nurses, with the support of the community. The principal characteristic of the second level of care is ambulatory care and hospitalization, as well as emergency care. This level requires the basic specialties in general hospitals or in specialty hospitals and provides imaging diagnostics and laboratory services. The level of care provided at the tertiary level is specialized, of increasing

complexity, and known for clinical and basic research activities. The 12 National Institutes of Health fall into this category.

More than 4,000 hospitals exist in Mexico (or 1 hospital per 100,000 population) (76, 77) and 1,047 belong to the public sector (86.8% are general and 13.2% are specialty).

In 2004, 19,695 health units existed, of which 80.8% belonged to the SSA, IMMS, and Opportunities Program, and 19.2% were used by those with private insurance. Of the health units, 94.31% provided outpatient care and 5.69% hospitalization (78).

The number of outpatient visits by the uninsured and insured populations in authorized public institutions increased from 231 million visits in 2000 to 250 million in 2004. Of the visits, 54.18% were for the insured population and 45.82% were for the uninsured, with the greatest number of visits by the IMSS (41.19%); followed by the SSA (38.56%); the ISSSTE (9.26%); and the IMSS-Opportunities, PEMEX, SEDENA, and SEMAR (the remaining 10.99%).

In 2004, 37.7 million specialty consultations were approved in the National System. The Federal District is the area with the greatest number of consultations of this type, with Tlaxcala and Baja California Sur in last place. Emergency consultations increased by 1.2% (25.5 million) in 2004, and dental visits increased by 6.3% (12.7 million) compared to 2000 (79).

In 2004, 3 million surgeries were performed, 2.7% more than in 2003. The number of births was around 1 million, which was similar in 2002. In 2004, hospital discharges and patient days were 4,719 and 20,613, respectively.

In 2004, 77,705 hospital beds were counted, and 54,113 health units, 2,626 surgical units, and 2,085 clinical laboratories and 1,888 radiology centers were found (80). The greatest percentage of hospital beds was found in the public sector in the SESA hospitals, followed by the IMSS, with a smaller percentage in PEMEX. At the state level, Durango had the greatest availability of counted beds for the population receiving care through the SSA, and the least availability was found in Baja California Sur with less than one bed per 2,000 population. The Federal District had the greatest availability of counted and total beds, and the fewest were found in the state of México (28, 77).

In 2004, the Even Start in Life Program achieved 11 million family planning visits, 69.3% for the uninsured population and 28.37% for the insured population. These visits allowed more than 10,352 patients to continue using their family planning methods and 2.2 million users were able to begin (78).

In 2004, a total of 257,039,893 studies were conducted, including clinical laboratory (87.82%), radiological (7.68%), other studies (2.83%), and anatomical pathology (1.67%) (81). In 2004, the Centers for Rehabilitation and Special Education (CREE) authorized 2.5 million rehabilitation therapy sessions, 1,101,312 consultations, and 32,463 functional interventions (such as prosthesis).

Blood banks are linked through a network headed by the National Blood Transfusion Center, which includes 31 state centers

and, in total, covers 598 blood banks, which receive 1.3 million donations annually. Ninety-six percent were replacement donations and 4% were altruistic donations, which was an increase of 3.87% over 2003 (82). In 2005, HIV/AIDS transmission was eliminated from all blood transfusion processes.

The Umbilical Cord Blood Bank was established in 2003 and is in charge of securing, processing, studying, storing, selecting, and releasing hematopoietic progenitor cells for allogeneic and/or autologous transplants obtained from umbilical cord blood.

Medical, ambulatory, hospital and emergency, and specialized services have grown in number, material resources, and financing with a positive direct impact on the quantity of services provided, such as visits, studies, donations, number of immunizations, and facilities for federal entities. Programs aimed at prevention, detection, and timely treatment, specifically for vulnerable groups also have been created.

The practice of traditional medicine has been legal in Mexico since 2005 and is defined as: “the joining of systems of health care that have their roots in the profound knowledge of health and disease of the different indigenous and rural populations that has accumulated through their history, based on an interpretation of the world, health, and illness of pre-Hispanic indigenous origin that has incorporated elements emerging from other cultures, such as old Spanish medicine, African medicine, and institutional Western medicine” (83). A high number of practitioners such as birth attendants, healers, bonesetters, and herbalists are used, as well as a variety of cultivated flowers. Traditional medicine has social recognition that has become a fundamental resource for the health of millions of people. Dependence on oral tradition, the plundering of natural areas in which practitioners obtain a large part of their resources, bio-pirating, and the exploitation of traditional knowledge are problems that affect the practice and development of traditional medicine. In Puebla, Chiapas, and Oaxaca, hospital-based care is being oriented toward a mixed approach, combining allopathic and traditional medicine while incorporating an intercultural focus on health care.

### Health Promotion

In 2004, in 29 of the federal entities 466 civil organizations, such as “Avales Ciudadanos” (“Endorsing Citizens”), worked to improve the quality of care in the delivery of health services. The “Avales Ciudadanos” are civil society organizations that, with a commitment to serve, receive training and endorse (or not) the results of indicators of proper conduct in health centers and hospitals (84). The program’s objective is to incorporate the population into the process of evaluating the quality of health services through their active participation in certifying or endorsing the processes and results of monitoring the indicators of proper conduct in medical settings, which will contribute to providing society with a sense of transparency and trustworthiness (85).

The SSA coordinates health promotion campaigns, which rely on mobilization at the municipal level. A total of 1,794 municipalities participated in 2004 in this mobilization and became part of a national network and 30 state networks.

### Health Supplies

The federal and state governments and social security allot funds for the acquisition of pharmaceuticals for public sector patients that are included in the basic table established by the General Health Council. The list includes 776 generic medications that have been determined to be effective, safe, high-quality, and accessible. The supply of these products is dominated by national companies and represents 80% of public acquisitions; the volume of sales in the private market represents 20%; in the public market the IMSS and the ISSSTE represent 80.3% and 14.2%, respectively, of the public acquisition of pharmaceuticals, while the federal and state systems represent 5.4%. The public sector is allowed to acquire only medications that are included on the list of bioequivalent interchangeable generics (86).

A regulatory framework and drug registry have been established to ensure that the producers comply with norms for effectiveness, safety, and quality. Two types of generic drugs exist: 1) interchangeable generics, which include products where the “substitutability” or possibility of substitution is demonstrated by a collection of clinical studies, and 2) “copycat products,” which include medications that lack the safety and effectiveness tests.

With the goal of stimulating the market for interchangeable generics, the General Health Council began requiring in 2002 that all public health institutions purchase interchangeable generics, when available in the Mexican market, instead of “copycat products.” Since this decision was made, the number of interchangeable generics has increased from 963 to 2,606 products.

### Human Resources

Mexico has 78 medical schools, of which 54 form part of the Mexican Association of Faculties and Schools of Medicine (AMFEM). In 2003, the National Association of Universities and Institutions of Higher Learning (ANUIES) registered 36 post-graduate programs in public health (87). Between 2000 and 2002 the number of admissions into nursing programs increased by 21.1% and into medical school by 26.3%.

The human resources of physicians and nurses are largely hired as salaried employees in public institutions, which does not lead to efficiency. On the other hand, a large proportion of physicians maintain private practices and are paid out-of-pocket.

Human resources in health that work in the public sector are distributed as follows: 143,605 physicians, of which 85% have direct patient contact, and of those 45% provide services to the

public and 55% work in social security. Nurses number 192,828, with 43% providing care to the population at large and 57% to those in social security (88).

During the last 10 years the number of professionals and technical health staff contracted by public institutions has increased; the number of physicians went from 0.3 per 1,000 population in 1993 to 1.20 in 1997 and to 1.14 in 2002 (89), lower than the Latin American average, which in 2000 was 1.79 per 1,000 population.

The distribution of human resources is unequal across the states. In the Federal District, human resources surpass 2.5 per 1,000 population, while the states of San Luis Potosí, Chihuahua, Michoacán, Oaxaca, Guanajuato, Baja California Sur, Puebla, Chiapas, and México do not even reach 1.0 per 1,000 population. Nationally, almost 45% of doctors are specialists, but there are states where more than 50% are specialists. The SSA is the institution with the largest number of contracted physicians (56,113), followed by the IMSS (55,842), the ISSSTE (15,574), and the IMSS-Opportunities (5,541). Public and private higher learning institutions rarely coordinate or plan their training policies, including content and practices for training, and therefore there is significant variation among their graduates (90). Nurses exceed 190,000: the IMSS contracts the greatest number (79,715), followed by the SSA (74,475), the ISSSTE (19,899), and the IMSS-Opportunities (6,847) (91).

Women outnumber men in the health services workforce. The medical profession is witnessing growth in the number of women, who in 1970 represented 19% of graduating physicians, but by 1999 represented half of graduates. However, there are still twice as many male physicians as women. Nursing is almost completely dominated by women (95%). Sixty-four percent of nurses have some technical training, 34% hold a bachelors degree, and 2% have some level of postgraduate training (92).

### Research and Technological Development in Health

The call by the National Council on Science and Technology (CONACYT) during the second half of 2005 lists the following specific priorities for health research: breast cancer, development of health systems, arterial hypertension, emerging infectious diseases (tuberculosis and HIV/AIDS), chronic renal insufficiency, and obesity (93).

The percentage of researchers belonging to the National System of Researchers (SNI) grew in all the National Health Institutes, decentralized hospitals of the SSA, and in the IMSS. In 2004, the National Institutes of Neurology and Neurosurgery, Respiratory Illnesses and Cardiology excelled in their performance.

Advancement has been made in telemedicine, and 1,025 health centers now have access to electronic content and the Internet (2005). Eighteen medical centers in the states of Puebla, Guerrero, Nuevo León, and Oaxaca have the professional equipment to conduct telemedicine, and in 8 federal entities telemedicine services and tele-education are offered (94).

The National Center of Excellence in Technology (CENETEC) has developed the Information Bank of Health Technology (BITS), which provides technological information in terms of efficacy, safety, cost-effectiveness, and norms to facilitate decision making in the purchasing and use of medical equipment (95).

### Health Sector Expenditures and Financing

Health services are financed by different sources. Social security is financed through worker-employer quotas and the services to the population at large through two large funds: those generated by the federal government and those that are provided by federal entities. Private financing largely comes from out-of-pocket expenditures or through private insurance (96). In Mexico it is estimated that only 4% of the population has private insurance and that half of that insurance is covered by employers who have the ability to deduct the cost of the premiums through their taxable income. The buyers of private insurance largely come from the high-income segments of the population.

The health sector is characterized by its relatively low public expenditure, below the Latin American average of 7% of the GDP, equivalent to 76,455.9 million pesos in 2005 (US\$ 6.863 million). Nonetheless, health expenditures in recent years increased from 5.6% of the GDP in 2000 to 6.3% in 2004, for a 13% increase (28).

Of the total public expenditure, 37.2% was spent in institutions that cover the uninsured population, through the SSA, the Institutes of Health, and the federal entities, which receive resources from the Contribution Fund to Health Services (FASSA); the remaining 62.8% was distributed to institutions that provide care to the insured population, such as the Secretariat of National Defense (SEDENA), PEMEX, IMSS, and ISSSTE, as well as the Secretariat of the Navy.

### Technical Cooperation and External Financing

In 2000, Mexico joined with 189 other countries in signing the Millennium Declaration, which carries a commitment to generate and strengthen regional and local programs and activities to eradicate poverty and hunger, improve education, provide gender equity, provide environmental sustainability, improve health, and strengthen global relationships for development (34).

In the area of technical cooperation, five areas of work (which contain 18 priorities and 45 lines of action) have been defined for the next five years. This proposal of strategic areas of work was established based on the reality identified through the Country Cooperation Strategy (CCS) exercise.

The World Bank is conducting the Health Quality, Equity and Development Program with an original budget of US\$ 350 million (97). With this program, equity in access to health services in underserved urban areas is promoted; it helps increase access and quality of health services for indigenous populations and

persons with lower levels of overall well-being; it supports institutional development; and it develops innovative models of care and preventive care for vulnerable populations.

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