

NICARAGUA



Sources: Second Administrative Level Boundaries Dataset (SALB), a dataset that forms part of the United Nations Geographic Database, available at: http://www.who.int/whosis/database/gis/salb/salb_home.htm, and the Digital Chart of the World (DCW) located at: <http://www.maproom.psu.edu/dcw>. The boundaries and names shown here are intended for illustration purposes only, and do not imply official endorsement or acceptance by the Pan American Health Organization.

Nicaragua has a surface area of 120,339.54 km² (1) and an estimated population (2005) of 5,142,098 inhabitants, 59% of whom reside in urban areas (2). The average population density is 42.7 inhabitants per km². The population is distributed unevenly among three geographical regions: the Pacific region (15.2% of the total land area, 54% of the population), the Central region (28.4% of the land area, 32% of the population), and the Atlantic region (56.4% of the land area, 14% of the population).

GENERAL CONTEXT AND HEALTH DETERMINANTS

The country is divided into 15 departments and two autonomous regions, which comprise 153 municipalities, most of which are rural or semiurban. While Spanish is the principal language, the nation is multiethnic and pluricultural, with mestizos making up the majority of the population. The indigenous peoples native to the Pacific and Central regions and the northern part of the country (Cacaoperas, Chorotegas, Nahuas, and Xiu), and the indigenous and Afro-descendant communities of the Atlantic region, consisting of Miskitos, Mayagnas, Garifunas, Ramas, Sumus, and Creoles (the latter also referred to simply as “Blacks”), make up close to 10% of the population (3).

Social, Political, and Economic Determinants

The political scenario over the last 15 years has been marked by problems of governance (4). A structural adjustment program launched in 1988 to reduce economic imbalances has been assessed as satisfactory (5); however, it has not received adequate support in the form of compensatory social measures and, consequently, it has generated widespread dissatisfaction and prompted frequent conflicts, expressed through strikes in key sectors of the economy (6), with negative effects for the population (7, 8). Government corruption during the 1997–2002 period (9) hindered economic development and governance, leading the current government to step up efforts to combat corruption and ensure transparency in the public sector. The fraudulent declaration of bankruptcy by several commercial banks, followed by government support measures, increased the country’s internal debt and exacerbated an already unfavorable economic situation, further compromising fiscal sustainability in the last five-year period (10). The agricultural sector continued to account for the largest share of gross domestic product (GDP), followed by the manufacturing sector (whose share of exports has grown) (11)

and the commerce and services sector. The tourism sector is gaining importance in the country’s overall economic development strategy, and a regulatory scheme is being developed for its management and strengthening (12). The positive economic growth observed since 1994 (3.9%, on average, between 1996 and 2003, 5.1% in 2004, and 4.0% in 2005) is the result of better macroeconomic performance and an increased flow of external resources, including family remittances and foreign direct investment. These factors, as well as the additional increase in public expenditure devoted to poverty reduction efforts, however, have not translated into better living conditions for the majority of the population (13). In 2004, GDP per capita was US\$ 754 (10).

In 2004, the Heavily Indebted Poor Countries (HIPC) initiative reached a culmination point, leading to cancellation of 80% of Nicaragua’s foreign debt. The doubling of prices for petroleum and its byproducts between 1999 and 2004 (9.0% of GDP) created imbalances in the national budget and in the balance of payments, notwithstanding the adoption of compensatory measures (10). Nicaragua remained highly dependent on external aid (10.3% of GDP in 2004) to maintain exchange stability, stimulate public investment, and pay off the public debt. The international environment continued to affect the Nicaraguan economy adversely, with diminishing terms of trade for its products owing to higher petroleum prices, an unfavorable balance of trade (more imports than exports), and increased public expenditure. The reduction of interest payments on the foreign debt, an increase in family remittances from abroad (12.2% of GDP in 2005) (11), and tourism helped to offset the trade deficit (10). In some areas of the Atlantic coastal region, drug trafficking was a factor in illegal foreign currency income (14).

In 2001, close to 2.3 million Nicaraguans (45.8% of the population) were poor; of this group, 15.1% lived in extreme poverty, with a higher proportion of poverty in rural areas (4.4 times more extreme poverty in rural areas than in urban ones) and in the Atlantic coastal region, where 12 out of 19 municipalities were extremely poor. Data from the Fourth Living Standards

Survey, conducted in 2005, seem to indicate a rise in levels of poverty (15).

The employment situation is critical. Although unemployment has shown a downward trend, there continue to be high levels of informal employment. While the minimum wage increased between 8% and 10% in 2004, the annual inflation rate that year was 9.8%. Workers' real wages declined despite the adoption of compensatory measures. The lowest monthly wage, in the agricultural sector, was only US\$ 41.50, and the highest, in the banking sector, was US\$ 98.00, neither of which is enough to cover the cost of a basic basket of goods and services in urban areas, estimated at US\$ 157.40 in December 2004. In 2004, the economically active population was estimated at 2,117,600 persons. According to official figures, of this group, 93.5% were employed (69% fully employed and 31% underemployed), and 6.5% were openly unemployed (16). There are obvious gender inequalities in the labor sector: in 2000, women's net rate of participation in the labor market was lower than that of men (38.6% versus 53.8%); female unemployment was higher than male unemployment (7% and 5.3%, respectively) (17); and women's rate of employment in the informal sector was higher and their wages were lower. Case studies on women's working conditions reveal lower wages, less job security, longer working days, and higher rates of temporary work and home-based subcontracting, all of which illustrates the disadvantaged situation of women (18). Employment in the maquiladora assembly industry increased; there were 59 companies operating under the duty-free regime, accounting for a total of 61,090 jobs.

In terms of the Human Development Index, in 2005 Nicaragua ranked 112th and was classified as a country with medium human development (19). However, development is unequal and there are enormous socioeconomic inequities associated with geographic location, sex, residence in an indigenous area, access to services, and income level. By way of illustration, the lowest income quintile received only 5.6% of national income, whereas the highest income group received 49.2%.

Indigenous peoples are concentrated in the lowest income quintile. Poverty is overwhelmingly rural: 7 of every 10 people in rural areas are poor and 3 of every 10 children are undernourished. The most frequent violations of women's rights are domestic and sexual violence. In the case of children, child labor and lack of adequate access to health services, educational opportunities, and food are the most common human rights violations.

The Reinforced Strategy for Economic Growth and Poverty Reduction (ERCERP), implemented during 2001–2003, rested on three pillars: broad-based economic growth and structural reform, investment in human capital, and protection of vulnerable groups (20). In 2003, the Government recognized that prevailing conditions (political climate, fiscal measures, international environment, and anti-corruption efforts) were not suitable for the application of this strategy (21), and it put forward a proposal for a National Development Plan (second-generation ERCERP) that

redefines expenditure on poverty and orients public investment towards enhancing the competitiveness of the private sector (rapid generation of employment and development of exports) (10). The productive strategy seeks to encourage the formation of production conglomerates (principally coffee, meat, dairy products, shrimp, forestry products, tourism, and light industry). Spending on poverty reduction (12.3% of GDP in 2004) is still financed out of external cooperation resources (6.2% external financing and 2.7% external debt relief under the HIPC initiative), with insufficient allocation of internal resources for that purpose (only 3.4%).

The Government views free trade treaties—with the Dominican Republic, Central America, and the United States of America (Central America–Dominican Republic–United States Free Trade Agreement [DR-CAFTA]); with Mexico and the Dominican Republic (already signed); and with Canada, Chile, Taiwan, and the European Union (under negotiation)—as concrete opportunities to stimulate development and expand Nicaragua's participation in the international market.

The country has embraced the Millennium Development Goals (MDGs) and has incorporated them into its National Development Plan (22). However, assessments indicate that most of the Goals (particularly those related to reduction of hunger and improvement of maternal and child health) (23) are not being met, nor are the mid-term targets (24), and that in order to achieve them it will be essential to increase public investment, address the needs of excluded groups (25), encourage citizen participation, and improve communication between local governments and civil society.

A government evaluation revealed high transaction costs, dispersion of resources, lack of linkage with local initiatives, and low impact in the achievement of the MDGs (26). A wide gap exists between the estimated available resources and the amount considered necessary to achieve the Goals. A recent study (27) projected that to attain the MDGs and national development goals, US\$ 5,300 million and US\$ 6,400 million would be needed, respectively, in cumulative social investment between 2001 and 2015.

The Nicaraguan Government is currently engaged in a reform process. In the health sector, headway has been made in recent years in the formulation of health policies and of a National Health Plan (2004–2015), and work on a policy on institutional reorganization is currently being intensified, with emphasis on decentralization (10).

In 2004, per capita expenditure on education was US\$ 79.30. The proportion of the school-aged population not being served decreased from 41.6% (1997–2001) to 36.5% (2002–2004). In 2003, 36.8% of the population aged 3–18 (836,980 children and adolescents) was not attending school; among children in poor households, the proportion was six times higher (10). In 2004, the net preschool enrollment rate was only 30.8%; net primary school enrollment was 82.6%, and net secondary enrollment was

40.1%. The illiteracy rate among the population over 10 years old was 18.7%.

Within the framework of agricultural policies that are unable to assure a sustained food supply for the population, poverty and rurality are decisive factors in the high level of food insecurity that affects many municipalities. The main causes of food and nutrition insecurity have been the limited availability of food, limited access to health services and education, and low levels of maternal formal schooling; their effects on the health situation are seen in height and weight deficits, higher maternal and child morbidity and mortality, higher rates of infectious and nutritional diseases, and reduced learning capacity and productivity (28).

Environmental degradation is worsening, as is the deterioration of production and habitat conditions. Nicaragua's great forest potential is being threatened by environmentally unsustainable practices, such as indiscriminate timber harvesting and ongoing expansion of the agricultural frontier, which have reduced dry forest cover by 85% and rain forest cover by 65% (29).

Social, political, and economic violence in recent decades has led to a rise in crime rates (30). In 1998, surveys of living standards included, for the first time, questions about domestic violence, which revealed that one in three Nicaraguan women had been a victim of abuse (31).

A high degree of population dispersion poses a challenge for the country's development and, in particular, access to health services. There are a total of 7,099 communities in the country, of which only 0.5% have more than 15,000 inhabitants, 2% have between 2,500 and 15,000, and 97.5% have fewer than 2,500. Under the social protection policy espoused by the Ministry of the Family, which emphasizes solidarity for development, various programs targeting vulnerable groups have been implemented, providing assistance to 366,349 children, adolescents, and adults in high-risk situations (3.8% of the total population).

With regard to the risk of emergencies and natural disasters, the country is exposed to hurricanes, earthquakes, volcanic eruptions, floods, landslides, and droughts. From 1931 to the present, earthquakes and hurricanes have claimed 14,897 lives. In recent years, hurricanes, floods, and serious food emergencies have occurred, mainly in the Atlantic region (32).

Imbalances created by unregulated economic development have increased the risk of technological disasters. The combination of poverty and environmental degradation in vast areas of the country has spawned high-risk enclaves in a country already recognized for its vulnerability to natural disasters. In several areas, water courses have been modified substantially and vulnerability to flooding has increased markedly, compounding soil deterioration and reducing the possibilities for sustainable production.

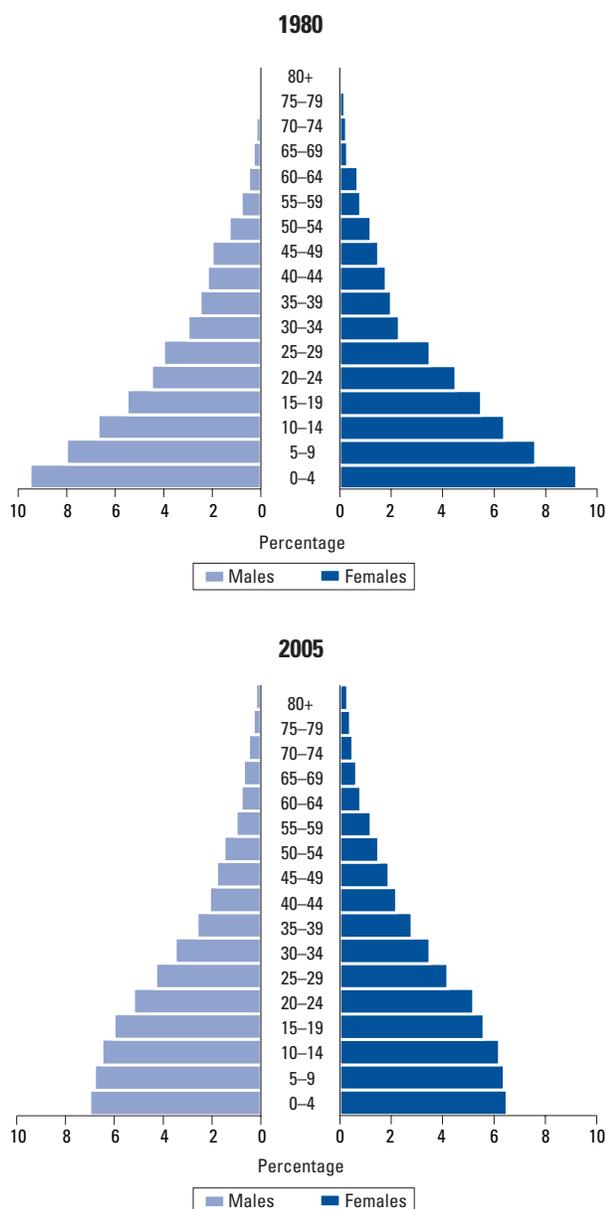
Demographics, Mortality, and Morbidity

During the 1995–2005 period, the annual rate of population growth decreased to 1.7%, which represents a significant change

with respect to the previous inter-census period (3.5%) (2). Population growth rates remained high in the North Atlantic Autonomous Region and in Nueva Segovia (4.9% and 3.4%, respectively). In 2001, the total fertility rate was estimated at 3.2 children per woman (7.2 in Jinotega and 5.2 in the North Atlantic Autonomous Region) and the crude birth rate at 26.9 per 1,000 population (15). Major disparities between urban and rural areas persist. In the current population structure (Figure 1), the expansion of the segment aged 10–30 years is apparent. Urban dwellers make up 59% of the total population. A comparison of the population pyramid from 1980 with the 2005 pyramid reveals a broadening of the base (population under 20 years of age), a phenomenon associated with declining population growth rates. That expansion will be even more evident after the adjustments resulting from the last census (2005)—which showed the population to be almost 10% smaller than estimated—are incorporated. During the period 2000–2005, life expectancy at birth was estimated at 69.5 years (70.4 years for women and 65.7 for men) (33), an increase of 1.5 years over the previous five-year period for both sexes.

Emigration and internal migration continue to be important demographic phenomena. Approximately 4% of the population has emigrated to another country, the most popular destinations being Costa Rica (45%) and the United States (39%) (34). Seventy-six percent of Nicaraguan emigrants lived in urban areas, 61% of this group have emigrated within the last 10 years, and 90% are working in the destination country. The quest for better opportunities has led to growing internal migration. The areas attracting the largest numbers of internal migrants during the 1990–2001 period were Managua, the North Atlantic Autonomous Region, and Río San Juan. The departments that lost the largest proportions of population were Matagalpa and Chontales. Internal migrants, the majority of whom are women who work in domestic service and the informal sector, tend to cluster around Managua and in urban areas in general. Internal migration by men is associated with agricultural production. Nicaraguan emigrants to Costa Rica have an irregular migration status and work in situations characterized by job instability, low wages, labor subcontracting, and lack of legal protection.

The crude death rate has shown a downward trend (5.6 per 1,000 population over the five-year period 1995–2000 and 5.2 per 1,000 population over the five-year period 2000–2005) (33). Mortality by age group in 2004 was 49.5 per 100,000 population in the group aged 1–4, 25.9 per 100,000 among those aged 5–14, 99 per 100,000 among those aged 15–34, 253 per 100,000 among those aged 35–49, and 1,759 per 100,000 in the group aged 50 and older (35). According to data from 2004, the mortality rate was 3.19 per 1,000 population among men and 2.35 per 1,000 population among women (36). Male mortality exceeded female mortality in all age groups. The population aged 50 and older accounted for the largest proportion of deaths (58%), and the population under 1 year of age accounted for the smallest (14.6%).

FIGURE 1. Population structure, by age and sex, Nicaragua, 1980 and 2005.

Source: Based on estimates from the National Statistics and Census Institute (INEC); figures do not reflect adjustments from the last census (2005) due to data unavailability.

The North Atlantic Autonomous Region and the South Atlantic Autonomous Region were the departments with the highest death rates.

The most recent five-year period saw a rise in the proportion of deaths due to diseases of the circulatory system and cancer

(malignant neoplasms). Between 1996 and 2004, diseases of the circulatory system remained the leading cause of death, accounting for 23.1% in 1996 and 26.0% in 2004, followed by external causes, which remained in second place (14% in 1996; 13% in 2004), and by cancer, which continued to rank third, although the proportion of cancer deaths increased markedly over the period (from 9.7% to 12.0%). Deaths from communicable diseases decreased from 9.3% to 8.0%, and deaths from disorders originating in the perinatal period fell from 7.7% to 6.0%, those two groups of causes ranking fourth and fifth, respectively, as causes of death (35). As can be seen in Table 1, the three leading causes of death in 2004 were ischemic heart diseases (11.1%), cerebrovascular diseases (6.9%), and diabetes mellitus (6.1%).

The coverage by the information systems of the Ministry of Health, the Vital Records Bureau, and the National Vital Statistics System is incomplete. Under-registration of deaths and births is estimated at 50% and 40%, respectively, with especially large gaps in data from the country's most geographically isolated regions. The statistics compiled by the Ministry of Health reflect demand by the population that has access to its services (approximately 60%–65% of the total population) (13). The morbidity and mortality figures cited in the following section on population groups were calculated by the Ministry of Health using as denominators the population estimates of the National Statistics and Census Institute, based on the previous census. As the new census conducted in 2005 found the population to be smaller than had been estimated, these figures may change in the near future (the final census data are not yet available). In view of the level of underreporting inherent in the Ministry of Health statistics, infant mortality rates were obtained using data from Demographic and Health Surveys conducted in 1998 and 2001.

HEALTH OF POPULATION GROUPS

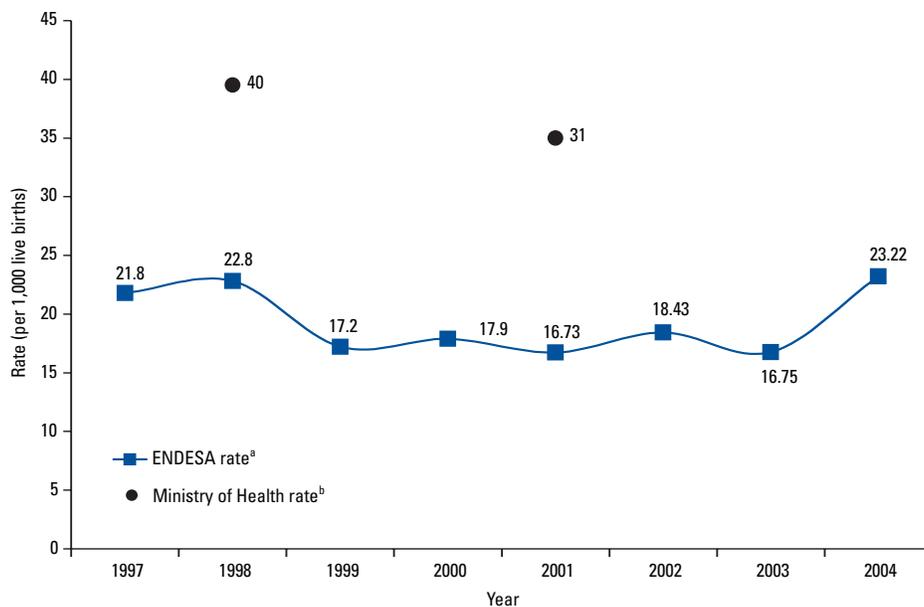
Children under 5 Years Old

Children under 1 year old made up an estimated 2.7% of the population in 2003. The infant mortality rate (estimated for a five-year period) dropped from 40 per 1,000 live births in 1998 to 31 per 1,000 in 2001 (Figure 2). The leading causes of death among children under 1 year of age were respiratory conditions of the newborn, sepsis of the newborn, asphyxia, pneumonia, congenital malformations, and intestinal infectious diseases. The rates were higher among males (39 per 1,000 live births versus 32 per 1,000 among females; these data are derived from an analysis of infant death rates for the last 10 years), among children born to mothers over the age of 40 (45 per 1,000 live births), among children born to mothers with more than seven children (59 per 1,000 live births), among children born within two years of the mother's previous birth (60 per 1,000 live births), among low-birthweight babies (36 per 1,000), and among children whose mothers received no care during the pre-

TABLE 1. Leading causes of death, Nicaragua, 1990 and 2004.

Causes	1990 (%)	2004 (%)
Ischemic heart diseases	4.1	11.1
Cerebrovascular diseases	5.7	6.9
Diabetes mellitus	1.5	6.1
Cirrhosis and other diseases of liver	1.4	4.6
Respiratory disorders specific to the perinatal period	4.9	4.3
Diseases of the urinary system	3.0	4.1
Hypertensive diseases	1.1	3.1
Influenza and pneumonia	7.5	3.0
Assault (homicide by firearm and/or sharp object)	1.3	2.9
Ill-defined causes	2.1	1.7
Other causes	67.4	52.2
Total	100	100

Source: Dirección de Estadísticas y Sistemas de Información, Ministerio de Salud de Nicaragua.

FIGURE 2. Infant mortality trends, Nicaragua, 1997–2004.

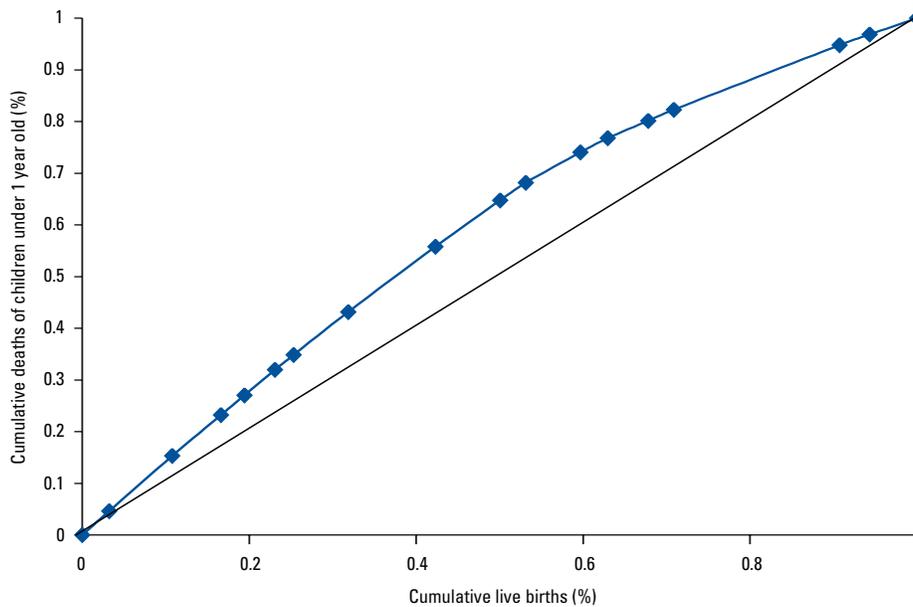
^aNicaraguan Demographic and Health Survey (ENDESA) data are from surveys conducted in 1998 and 2001.

^bMinistry of Health (MINSAL) figures are estimated to be underreported by 40%–50%.

natal period or during childbirth (66 per 1,000) (37). Infant mortality was also higher among children born to mothers with no formal education (54 per 1,000), mothers in the lowest income quintile of the population (49.6 per 1,000), mothers living in rural areas (43 per 1,000), and in the Atlantic region (48 per 1,000). As can be seen in Figure 3, close to 70% of infant deaths were concentrated in 50% of the population. The Lorenz curve, both for infant mortality and for maternal mortality (Figures 3

and 5), illustrates the uneven distribution of infant and maternal deaths in the population.

Children 1–4 years old accounted for 10.6% of the population in 2003. Mortality in this group was 10 per 1,000 live births, and was higher among children born to mothers over 40 years of age (18 per 1,000), children born to mothers with more than seven children (16 per 1,000), children born within two years of the mother's previous birth (15 per 1,000), children born to

FIGURE 3. Lorenz curve for infant mortality, Nicaragua, 2001.

Source: Infant deaths estimated on the basis of ENDESA infant mortality figures for 2001; the number of live births was obtained from National Statistics and Census Institute (INEC) estimates of population and birth rates for 2001.

mothers who had received no care during the prenatal period or during childbirth (31 per 1,000), children born to mothers with no formal education (19 per 1,000), and children in rural areas (13 per 1,000), in the Central and Atlantic regions (13 and 12 per 1,000, respectively), in the departments of Jinotega and Madriz, and in the North Atlantic Autonomous Region (37). Pneumonia and intestinal infectious diseases were the leading causes of death (13).

In summary, estimated child mortality for the last five-year period was 40 per 1,000 live births (37). As Figure 2 shows, infant mortality declined between the 1998 and 2001 Demographic and Health Surveys; however, the rates calculated on the basis of Ministry of Health sources indicate a fluctuating pattern, which is partially a reflection of under-registration of deaths. The infant mortality rate was higher among male children (48 per 1,000 live births), among children born to mothers over the age of 40 (62 per 1,000 live births), among children born to mothers with more than seven children (74 per 1,000), among children born within two years of the mother's previous birth (74 per 1,000), among children born to mothers who had received no care during the prenatal period or during childbirth (95 per 1,000), among children born to mothers with no formal education (72 per 1,000), and in rural areas (55 per 1,000), in the lowest income quintile (64.3 per 1,000), in the Central and Atlantic regions (50 and 59 per 1,000, respectively), in the departments of Jinotega and Madriz, and in the North Atlantic and South Atlantic Autonomous Regions (64.3 per 1,000) (37).

In 2001, half of children under 5 years of age (48% of those under 1 year and 51% of those aged 1–4 years) had been ill in the month preceding the last survey of quality of life; the most frequent causes were respiratory problems (16% and 20%, respectively, in the two age groups), diarrheal diseases (28% and 24%), chronic diseases (0.2% and 1.6%), and other problems, including accidents and injuries (4.6% and 5%). Among children under 3 years of age, 94.5% had been breast-fed at some time, but of those children, 26.7% had received some other type of food before breast-feeding was initiated. Only 12% of children under 6 months of age were being exclusively breast-fed, and the median duration of breast-feeding was 17 months (37).

Children 5–9 Years Old and Adolescents 10–14 and 15–19 Years Old

In 2003, children aged 5–9 made up 13% of the population. The leading causes of death in this group were transport accidents, pneumonia, leukemia, meningitis, malnutrition, and accidental drowning. The group aged 10–14 made up 12.5% of the population and the group aged 15–19, 11.7%. There is little analysis of the information on these age groups, and the data compiled generally cover the age range from 5 to 14 years. In 2001, 31% (31.5% of males and 30.5% of females) were reported to have been ill in the month preceding the last quality of life survey: 18% due to respiratory problems, 2% due to diarrhea, 3% due to chronic problems, and 8% due to other causes, including

accidents and injuries. The main causes of death among adolescent boys were homicide, transport accidents, and suicide, while among adolescent girls the leading causes were problems related to pregnancy and childbirth, homicide, and suicide. Maternal deaths among adolescent girls accounted for one-third of total maternal mortality (38). The main causes of morbidity in male adolescents were injury, poisoning, other external causes, and sexually transmitted infections, while among female adolescents they were complications of pregnancy, childbirth, and the puerperium; domestic and sexual violence; injury; and poisoning. Adolescents aged 15–19 accounted for an estimated 32% of self-inflicted injuries (intentional self-harm) (39).

A 2005 study found that 11% of Nicaraguan women had become sexually active before the age of 15 (40). The fertility rate among adolescents aged 15–19 decreased from 130 per 1,000 population in 1998 to 119 per 1,000 population in 2001 (41). The proportion of births to adolescent mothers fell from 31.0% of all births in 1997 to 27.7% in 2004 (36). Education is one of the key determinants of adolescent motherhood: 46% of adolescent girls without formal schooling had children or were pregnant, whereas among adolescents with a university education the figure was 5% (36). The proportion of pregnant adolescent girls receiving prenatal care was 85.7% (37). An estimated 12.1% of adolescents aged 15–17 have children (42), and 19.8% of young women aged 15–19 reported having unmet family planning needs (37). Knowledge among adolescents about how to prevent sexually transmitted infections was insufficient, even though 91% had heard of AIDS and 24% of syphilis (43).

Adults 20–59 Years Old

In 2001, one-third of the adult population (32% in the segment aged 25–34, 44% in the segment aged 35–49, and 60% among those aged 50 and older) reported having been ill in the month preceding the last quality of life survey: 16% due to respiratory problems and 22% due to other problems, including accidents, injuries, and chronic disorders. The proportion of women reporting illness was higher than that of men; there is also more information available on the health of women.

The total fertility rate fell from 3.6 children per woman in 1998 to 3.2 in 2001 (37). The gap between desired fertility and actual fertility rate was significantly wider in the lowest income strata (5.5 actual versus 3.8 desired) than in the highest income strata (1.7 actual versus 2.5 desired). An estimated 66% of women of childbearing age have used some method of family planning. Among women currently living with a male partner, 88% have used a family planning method, generally a modern one: contraceptive pills (59%), injections (38%), female sterilization or IUD (25% each), condom (23%), or the lactational amenorrhea method (16%) (37). Sixty-six percent of pregnant women received prenatal care, 34.4% of them beginning in the first trimester (23.7% in Río San Juan) (36). The proportion of

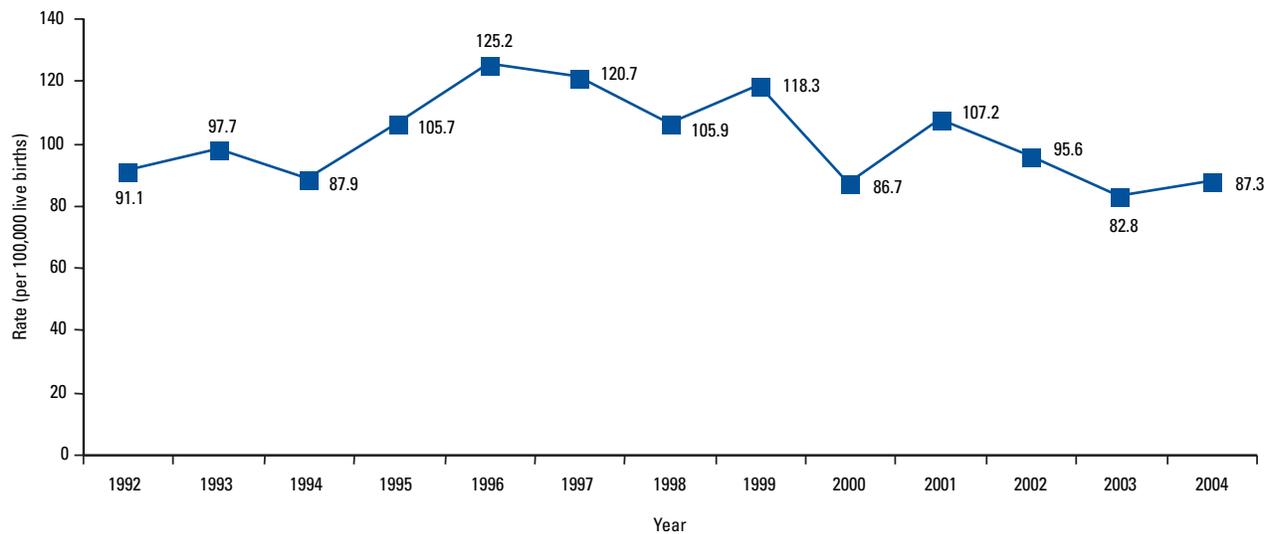
births occurring in health care facilities increased slowly, due in large part to increased access and participation by the private sector in urban areas; in 2004, the proportion was 51.6% (30.6% in Río San Juan, 31.3% in Chontales, 37.5% in Boaco, 40.6% in the North Atlantic Autonomous Region, and 41.1% in the South Atlantic Autonomous Region, the area with the least road infrastructure and the highest degrees of poverty). Among women who did not give birth in a health care facility, 72% received no postpartum care (37). Nevertheless, the percentages of women receiving institutional care during the puerperium have improved, rising from 20% in 1994 to 46.8% in 1997 and 50% in 2000, but then increasing only slightly between then and 2004 (50.7%).

Between 1992 and 2005, maternal mortality fluctuated, reaching its highest levels in 1996, 1997, and 1999. The rate has declined over the last five years, dropping to 87.3 per 100,000 live births in 2004 (35) (Figure 4). Like infant mortality, maternal mortality has shown a variable pattern, trending downward during the period under study.

Postpartum hemorrhage remained the leading cause of maternal mortality, accounting for 48%, followed by puerperal sepsis (15%) and eclampsia (14%); these causes were associated with high fertility, short birth spacing, and limited coverage and quality of services providing prenatal care, attendance at birth, and care for complications. Although maternal mortality has declined for the country as a whole, rates remained high in rural areas (e.g., Jinotega, 214.9); in the autonomous Atlantic regions, which have large ethnic communities (Autonomous North Atlantic Region, 184.7; South Atlantic Autonomous Region, 180.6); and in areas where access to health care facilities is limited, educational levels are low, and poverty rates are high. Figure 5 shows that 50% of the population accounted for 80% of maternal deaths.

Older Adults 60 Years Old and Older

Older adults accounted for 5.0% of the population in 2000, with women outnumbering men (male-female ratio = 1:1.2). In 2000, the aging index, which is the ratio of the population over 60 years of age to the population under 15 years of age, was 11 older adults per every 100 children under 15. It is estimated that around 60% of older adults are heads of household; of these, 76% of them are men and 24% are women; 42.2% of older adults are economically active, 94% are employed, and 6% are openly unemployed. In general, they are self-employed or they work in some capacity for their families. No differences were found between men and women, although in Managua the percentage of older women who worked was higher than that of men (15). According to the last quality of life survey conducted in 2001, 75% of the population over the age of 65 years (79.9% of women and 70.0% of men) reported having been ill in the month preceding the survey, 45% due to chronic diseases, 17% due to respiratory problems, 1% due to diarrheal diseases, and 12% due to other problems.

FIGURE 4. Maternal mortality rates, Nicaragua, 1992–2004.

Source: Department of Statistics and Information Systems, Ministry of Health of Nicaragua.

The Family

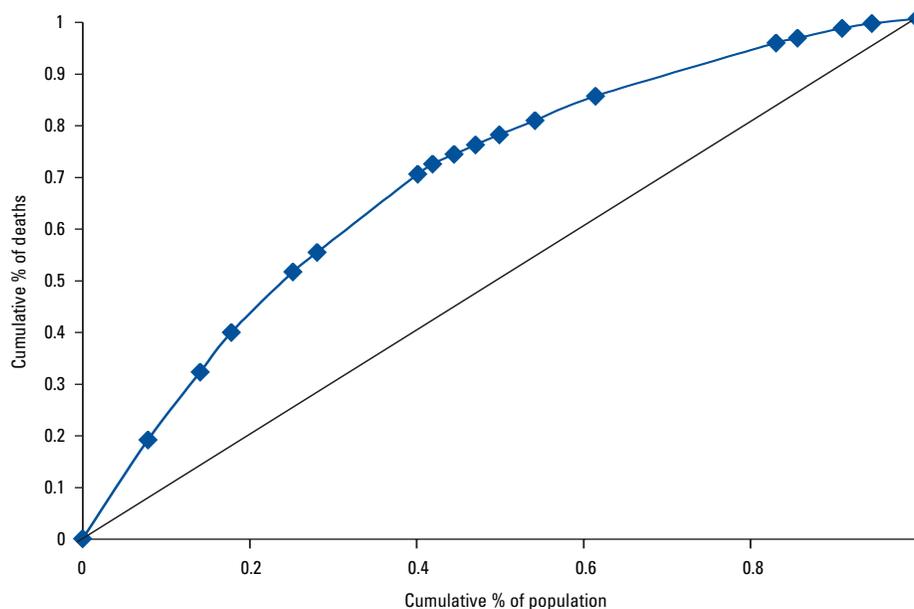
The 2005 census counted 1,044,476 households with an average of 4.9 people per household. According to data from the eighth population census and the fourth housing census, both conducted in 2005, 94.7% of dwellings are inhabited by one household; 4.1%, by two households; and 1.2%, by three or more households (2). The proportion of families headed by males has remained stable: 71.9% in 1993, 72.3% in 1998, and 71.1% in 2001, although in urban areas a higher proportion of households are headed by women, most of them widowed or separated (15). The proportions of female single parents participating in productive and reproductive work were 47.3% and 87.8%, respectively. The new comprehensive health care model focuses on the health of the family and the community in a framework of health promotion and disease prevention. Morbidity and mortality data on family health are included in the analysis of the health of the various age groups.

Workers

The number of workers in the country was estimated at 1,973,100 in 2004. Most of them (82.4%) received health care from public facilities operated by the Ministry of Health, which do not keep specific statistics on occupational accidents and diseases. For the 17.6% of workers covered by the social security system, reporting of occupational accidents and diseases is mandatory. Employers are also required to report work-related accidents and diseases to the Ministry of Labor, but the inspections conducted by the Ministry to monitor compliance with this

requirement only cover 6.4% of the working population. A study carried out in León on working conditions in the informal sector (44) found that the main obstacles to the achievement of health goals are poverty; lack of coverage of basic health services; the growing proportion of households headed by women—who carry out the double function of earning wages to sustain their families and performing unpaid domestic labor; low and unstable incomes; performance of work that is not socially valued; and exposure to multiple risks, many of them environmental, including exploitation and mistreatment in the workplace.

Official surveys conducted on child labor indicate that the number of children aged 5–17 participating in the labor market fell from 314,012 in 2000 to 266,000 in 2005 (45). Of that number, 90% were working at the time of the survey (76% in the informal sector). The male-female ratio was 2.8:1. Of these active child workers, 74% were male and 26% female, and 11% were between 5 and 9 years of age. Although under current legislation children under age 14 are not allowed to work, eight out of 10 adolescent workers began working before their 14th birthday. Two-thirds worked as unskilled laborers, and more than half did not attend school for work-related reasons. An estimated 20% of children aged 7–17 are illiterate; this percentage is three times higher in rural areas. Approximately one-third of working adolescents reported having suffered work-related injuries. There are no official statistics on sexual exploitation of children; however, specialized agencies serving children agree that sexual exploitation of children for commercial purposes and the trafficking of minors are a reality of growing concern, especially in border, tourist, and industrial cities of the Central American countries

FIGURE 5. Lorenz curve for maternal mortality, Nicaragua, 2001.

Source: Maternal mortality figures are obtained from Ministry of Health data and INEC population estimates for 2001.

(46, 47). In August 2001, the Government of Nicaragua approved a public policy against the commercial sexual exploitation of children and adolescents.

Trafficking of women and forced prostitution are recognized problems in Nicaragua. According to the Nicaraguan Center for Human Rights, there are some 1,200 sex workers in Managua, 40% of whom are girls under 18. A study conducted among 300 girl prostitutes found that 56% became sexually active at 12 or 13 years of age, 28% had been raped, and 50% had sex with more than five clients per day (48).

Persons with Disabilities

According to the results of a 2003 survey, the prevalence of disabilities in the population over 6 years of age was estimated at 10.3% (11.3% among females and 9.1% among males, 10.5% among urban dwellers and 10.1% among rural dwellers) (49). The prevalence of disability increases with age, the percentages ranging from 3.7% among children aged 6–9 to 85.3% among adults over age 80. The prevalence of impairments affecting the ability to perform certain activities was estimated at 58.0% for comprehension and communication, 75.2% for mobility, 22.6% for self-care, 26.6% for ability to relate to others, 49.9% for household activities, 30.2% for work or school activities, and 53.9% for participation in society. With regard to causes, disabilities are associated mainly with chronic diseases (67%); birth defects and injuries (9%); falls, injuries, and other accidents (9.5%); infec-

tious diseases (4%); occupational diseases (3.4%); motor vehicle accidents (2.3%); war (2.2%); and assault (1.8%). Fifteen percent of people with disabilities had suffered physical or psychological violence, and 14% had suffered some kind of accident during the last year.

Ethnic Groups

The areas with the highest proportions of indigenous populations have the worst health disparities in the country. In 2005, the maternal mortality ratio in the North Atlantic Autonomous Region was 2.1 times higher than the national average and the perinatal mortality rate was 1.6 times higher (36). The percentages of indigenous populations living in areas at high risk for natural disasters are estimated at 100% for the Ramas, 90% for Mayaguanas, and 61.6% for Miskitos, compared to the national average of 31.8%. Indigenous communities reported less access to family planning services, prenatal care, and care during childbirth. For example, 29.3% of Miskito mothers received no prenatal care (versus 12.3% for the country as a whole), and 57.4% did not give birth in a health care facility (compared to 27.7% for the country as a whole) (50). More than a third (33.7%) of Miskito children and 100% of Ramas children suffered from chronic malnutrition (19.6% for the country as a whole); 12.8% of Miskito children suffered from overall malnutrition (8.9% for the country). Miskito communities consume the equivalent of only 70% of the average per capita food intake in Nicaragua and 49.8% cannot

afford a basic food basket (34% for the country as a whole) (50). The higher incidence of *Plasmodium falciparum* malaria and of tuberculosis was found in the indigenous Atlantic regions. More than 90% of all *P. falciparum* malaria cases in 2001 were concentrated in 24 municipalities with indigenous populations.

Border Populations

Residents in the Río Coco area along the northern border with Honduras and the Río San Juan region along the southern border with Costa Rica face situations of isolation and lack of access to health services. Nicaraguan women who emigrate to Costa Rica exhibit a less favorable maternal and child health profile than their Costa Rican counterparts: they have a lower educational level, they use contraceptives less, and they have less access to health services in general and to preventive services in particular. On the positive side, Nicaraguan female emigrants have lower rates of tobacco use (6% have smoked at some time versus 14% of Costa Rican women) and fewer cesarean births (13% versus 20%), and a higher proportion of them have been vaccinated against tetanus in the last 10 years (83% versus 73%) (51).

HEALTH CONDITIONS AND PROBLEMS

COMMUNICABLE DISEASES

Vector-borne Diseases

Much of the information presented in this section is based on Ministry of Health national surveillance data (52).

In the last 10 years, the number of **malaria** cases has declined significantly, the annual parasite incidence (API) having dropped from 1.72 per 1,000 population (71,380 cases) in 1995 to 0.11 per 1,000 (6,373 cases) in 2005. Over the 2001–2005 review period, eight comprehensive local health systems (SILAIS) recorded high rates of malaria transmission: those of the North Atlantic Autonomous Region, the South Atlantic Autonomous Region, Río San Juan, Chontales, Matagalpa, Jinotega, Chinandega, and Nueva Segovia. Approximately 36 high-risk municipalities accounted for 93% of the total morbidity burden for the country. In 2004, reported morbidity was 10.7 per 10,000 population, with high rates in the North Atlantic Autonomous Region, the South Atlantic Autonomous Region, Matagalpa, Jinotega, and Chinandega. Around 83% of the cases were caused by *Plasmodium vivax* and 17% by *P. falciparum*; less than 1% were mixed infections. *Anopheles albimanus*, the main vector in Nicaragua, is found in all of the country's 17 departments and regions. Limited foci of transmission exist for *A. pseudopunctipennis* in the Pacific region (Chinandega and Managua). By age group, the highest rates occurred among children 1–4 years old (21.4 per 10,000) and those 5–14 years old (14 per 10,000). The male population was most affected (accounting for 70% of cases). Ninety-five percent of the *P. falciparum*

cases were concentrated in the North Atlantic and South Atlantic Autonomous Regions. In 2005, the malaria mortality rate was 0.13 per 100,000 population. Eight deaths were registered in 2002, seven in 2003, one in 2004, and six in 2005. Malaria morbidity and mortality have shown a slow but steady downward trend, and the goal proposed by the World Health Organization (WHO) of halving malaria mortality by 2010 and reducing the malaria morbidity burden by 2015 is considered to be feasible, provided the control strategies applied to date are consolidated. These strategies have strengthened the capacity for early diagnosis and timely treatment, as well as detection of epidemics, control of breeding sites, human resources development focusing on vector behavior, and malaria stratification to the “malarious household” level (i.e., households with at least one malaria-positive individual).

In the last five years, **dengue** has shown an endemic-epidemic pattern, with outbreaks associated with the introduction of a new serotype in a specific area of the country. Between 2002 and 2005, all of the 17 departments and regions reported dengue cases. Circulation of serotypes 1, 2, and 4 was confirmed by the national reference laboratory, but it is serotype 2 that has had the greatest impact in terms of morbidity and mortality. The reported dengue morbidity rate in 2003 was 4.7 per 10,000 population for classical dengue and 0.4 per 10,000 for hemorrhagic dengue, decreasing in 2005 to 3.2 per 10,000 and 0.3 per 10,000, respectively. In 2004, the areas most heavily affected by the classical form were the departments of Masaya and Madriz and the North Atlantic Autonomous Region, and those most heavily affected by the hemorrhagic form were Masaya and Granada. The population aged 5–14 had the highest morbidity (4.5 per 10,000 population), followed by the group aged 15–49 (3.0 per 10,000); 54% of the cases occurred among women and 46% among men. In 2005, overall dengue mortality was 0.2 per 100,000 population (six deaths). The case fatality rate for hemorrhagic dengue was 3% (53).

Three forms of **leishmaniasis** have been identified in Nicaragua: cutaneous (99% of cases) and atypical cutaneous (0.57%), caused by *Leishmania chagasi*; mucocutaneous (0.4%), caused by *Leishmania (V.) braziliensis* and *Leishmania (V.) panamensis*; and visceral (0.03% of cases). Thirty-one species of *Lutzomyia* have been identified, two of which are vectors of cutaneous and mucocutaneous leishmaniasis—*Lu. panamensis* and *Lu. ylephiletor*—and one is a vector of cutaneous and visceral leishmaniasis—*Lu. longipalpis*. Leishmaniasis in its various clinical forms has shown an upward trend, the number of cases rising from 959 in 1995 to 3,312 in 2005. In 2004, the incidence of leishmaniasis was 3.5 per 10,000 population (54). The highest incidence was recorded among the group 1–4 years of age (10.5 per 10,000 population), followed by the group aged 5–14 (8 per 10,000) and by the group aged 15–49 (4.2 per 10,000). Women accounted for 52% of the reported cases and men for 48%. Sixty percent of the cases occurred in Jinotega; 22% in Matagalpa; 9% in Chontales; and the remaining 9% in Río San Juan, the North Atlantic Autonomous Region, and the South Atlantic Autonomous

Region. The geographic distribution of the disease is related to the opening up of new agricultural lands in jungle areas (in the case of the cutaneous and mucocutaneous forms) and to unplanned urbanization (in the case of the visceral form) (55).

The main vectors of **Chagas' disease** were investigated by means of entomological surveys conducted during the 1998–1999 period, which found *Triatoma dimidiata*, *Rhodnius prolixus*, and *Triatoma ryckmani* in Diriamba, San Fernando, and Chinandega; *Triatoma nitida* in San Rafael and Jinotega; and *Panstrongylus geniculatus* in El Rama, San Carlos, and San Miguelito. *R. pallidus*, detected in Río San Juan, was not reported until 2002. The disease is significantly underreported, which makes it difficult to determine its true magnitude. Seroprevalence studies of 150,000 blood donors during the 1990s found rates of 0.3% in Managua and 11% in the northern portion of the country (mainly Madriz, Nueva Segovia, and Matagalpa). In 2000, a serologic survey of schoolchildren aged 7–14 in all 15 departments (56) found an overall seroprevalence of 3.6%. Another serologic survey, carried out in 2003 among children under 15 years of age in communities with a known presence of *R. prolixus*, revealed a seroprevalence of 10.8% in Madriz, 4.3% in Nueva Segovia, 1.8% in Chinandega and Jinotega, and 0.2% in Masaya. In the municipality of Esquipulas, in communities infested with *T. dimidiata*, seroprevalences of 1% among children under 15 and 1.7% among pregnant women were reported.

Vaccine-preventable Diseases

There have been no reported cases of **poliomyelitis** since 1981, none of **diphtheria** since 1987, and none of **measles** since 1994. A national vaccination campaign targeting the population aged 6–39 was carried out against **rubella** and congenital rubella syndrome in 2005, and coverage of 100% was achieved. Between 2001 and 2005, 38 cases of non-neonatal **tetanus** were reported (mostly among adults), 11 cases of **whooping cough** (10 of them in the South Atlantic Autonomous Region in 2002), and 3 cases of neonatal tetanus (the last one in 2005). Nicaragua has taken advantage of Vaccination Week in the Americas to reach vulnerable populations and children who had never been vaccinated, thus improving immunization coverage in all municipalities.

Intestinal Infectious Diseases

Mortality due to intestinal infectious diseases decreased from 1.9% in 2002 to 1.4% in 2004 (57). Reported morbidity from acute diarrheal diseases remained virtually unchanged (372 per 10,000 population in 2000 and 358 per 10,000 in 2004), with the Caribbean regions reporting rates 2.2 times higher than the national average. The departments with the highest rates were those with the lowest rates of drinking water services coverage. The last 12 cases of cholera were reported in 2000. In 2005, the prevalence of geohelminth infection was found to be 49.3% (58) among 8-year-old children in urban and rural areas of four departments (Chinandega, Chontales, Estelí, and Granada). Intense infection

was reported in rural and periurban schools in Chinandega and Chontales (between 2.0% and 4.5% of the children examined).

Chronic Communicable Diseases

Tuberculosis is endemic in Nicaragua, but has shown a downward trend over the past decade. The incidence of all forms of tuberculosis for the country as a whole fell from 88 per 100,000 population in 1987 to 39 per 100,000 population in 2004 (although very high rates persist in the North Atlantic Autonomous Region, where the incidence is 110.3 per 100,000, and in the South Atlantic Autonomous Region, where the incidence is 58.8 per 100,000). Between 2003 and 2004, case detection decreased by 2.7%. In 2004, 2,220 cases were detected, of which 60% were sputum-positive pulmonary cases, 20% were sputum-negative pulmonary cases, 15% were extrapulmonary forms of tuberculosis, and 5% were relapsed cases (with higher percentages in the North Atlantic Autonomous Region and the South Atlantic Autonomous Region). The 15–34-year-old age group accounted for 49.2% of the sputum-positive cases in 2004. More than half (55%) of the new sputum-positive cases occurred among males. The tuberculosis death rate in 2003 was 1.4 per 100,000 population. In 2003, analysis of a cohort of patients who had received Directly Observed Treatment, Short Course (DOTS) and who were subsequently retreated revealed a mortality rate of 4.6% (79 of the 1,699 patients died). The highest incidence rates, sputum-positive rates, and relapse rates occurred in the North Atlantic Autonomous Region. Between 1987 and 2005, a total of 52 patients with tuberculosis and HIV infection were reported. The SILAIS of Chinandega reported a total of 11 coinfection cases (21.1%) and the SILAIS of Managua, 19 (36.5%). Tuberculosis-HIV coinfection is most frequent in the population aged 20–30.

During the 2001–2005 review period, five new cases of **leprosy** were diagnosed each year; all were from the departments of Managua and Chinandega.

Acute Respiratory Infections

Diseases of the respiratory system were the leading cause of morbidity reported by interviewees in the 2001 Demographic and Health Survey who reported having been ill in the 30 days prior to the survey (38.2%) (37). The incidence of acute respiratory infections for all ages decreased from 2,513 per 10,000 population in 1999 to 2,338 per 10,000 population in 2004 (36). In 2005, the South Atlantic Autonomous Region and Matagalpa had the highest rates. **Influenza** and **pneumonia** accounted for 3.7% of deaths in 2002, a figure which decreased to 3.2% in 2004 (57).

HIV/AIDS and Other Sexually Transmitted Infections

The prevalence of HIV infection in the general population remained low (< 1%). The annual incidence of HIV infection increased from 2.52 per 100,000 population in 2000 to 7.66 per 100,000 population in 2005, with a rapid rise in the rate observed. Prevalence of over 9% was reported among men who have

sex with men (59). Among HIV-positive heterosexuals, the proportion of infected women rose from 31% in 2000 to 37% in 2005 (60). As of December 2005, 2,031 cases of HIV/AIDS had been reported, 72% among males and 28% among females, with 0.68% occurring among persons under 15 years of age. During 2005, 420 HIV-positive cases were reported (323 carriers and 97 cases). Of those 97 cases, 46 remained alive and 51 had died from the infection (61). The male-female ratio in 2005 was 2.4:1. The largest number of cases was recorded in Managua, Chinandega, and León. HIV/AIDS is significantly underreported. The prevalence of AIDS in the population aged 15–49 was estimated at 0.2% in 2005 (62). Sexual transmission is the predominant form of HIV transmission, accounting for 92.0% of cases (74.0% heterosexual transmission and 26.0% transmission between men who have sex with men), followed by perinatal transmission (3.0%), injection of intravenous drugs (3.0%), and blood transfusion (0.2%). Data on transmission are incomplete in 2.2% of cases.

Other sexually transmitted infections are found most frequently in the population aged 20–24 (30% of cases). In 2005, 3,517 cases were reported, mainly of **gonorrhea**, **condyloma**, and **acquired syphilis**. The male-female ratio for all cases of sexually transmitted infections was 1:1; however, women had a higher frequency of condyloma and men of gonorrhea. The Atlantic region, Chinandega, and Managua had the highest incidence rates (61).

Several studies have identified early initiation of sexual activity and deficient knowledge, attitudes, and practices with regard to sexuality as risk factors for sexually transmitted infections; 60% of those interviewed in a 2001 survey stated that condoms are not effective in preventing HIV/AIDS, 86% reported that they did not use condoms with their regular sexual partner, and only 15% said they used condoms as a contraceptive method (63). Sixty percent of male respondents and 65% of female respondents did not believe that they were at any risk of contracting HIV/AIDS (64), and 20.4% of female respondents did not know how to avoid becoming infected with HIV/AIDS (37).

There were 19% of men in Managua and 24% in the Caribbean region (which comprises the North Atlantic Autonomous Region and South Atlantic Autonomous Region, and the Río San Juan area along the Caribbean coast) who reported having experienced at least one sexually transmitted infection, in most cases gonorrhea. Although those interviewed had basic knowledge about sexually transmitted infections, it was evident that many myths and widespread misinformation continue to exist with regard to these infections and to condom use (63).

Zoonoses

The incidence of urban canine **rabies** declined sharply, with only two cases being reported during the 2001–2005 period under review. No cases of human rabies have been reported since 2000 (65). In some municipalities (Sauce, Bluefields, Jinotega, León, Achuapa), **leptospirosis** remained endemic during

2001–2005, with 318 cases but no deaths. The proportion of laboratory-confirmed cases increased (29%), and overall incidence of the disease rose from 0.33 per 100,000 population in 2000 to 1.65 per 100,000 population in 2005 (66).

NONCOMMUNICABLE DISEASES

Metabolic and Nutritional Diseases

Child **malnutrition** remained severe in 2001; 20% of children under 5 years of age suffered from chronic malnutrition and 6.3% from severe chronic malnutrition (37) (14.3% in the North Atlantic Autonomous Region, 12.1% in Jinotega, 11.8% in Madriz, and 10.7% in Matagalpa). An estimated 9% of infants were born with low birthweight, and around 4% of women of childbearing age had nutritional problems. Among children under 5 in the poorest quintile, the proportions suffering from chronic and overall malnutrition were 35.2% and 16%, respectively; these are significantly higher percentages than among children in the highest income quintile (4.4% and 2.7%, respectively). This disparity is due to food insecurity, which affects rural areas in particular. Deficits in early stimulation and adequate nutrition increased children's vulnerability, which was also affected by the mother's educational level and the number of young children in the household. According to the second national height census conducted among first-grade schoolchildren in 2005, 27.2% of children aged 6–9 suffered from chronic malnutrition, and 6.5% exhibited severe stunting. The prevalence was higher among males in rural areas, and it increased with age. The departments with the highest rates were Madriz, Jinotega, Matagalpa, Nueva Segovia, and the North Atlantic Autonomous Region. In 46.3% of municipalities, the prevalence of growth retardation was higher than the national average; the most affected municipalities were Las Sabanas, San José de Cusmapa, San Juan de Río Coco, Telpaneca, Totogalpa, and San Lucas, in the department of Madriz; Rancho Grande, Tuma-La Dalia, and San Ramón, in the department of Matagalpa; and El Tortuguero in the South Atlantic Autonomous Region. The prevalence of **vitamin A deficiency** has shown a clear decline, dropping from 31.3% in 1993 to 25.9% in 2003 and 17.0% in 2004. Only 13.4% of the population was found to have urinary excretion of **iodine** below 10 µg/dL, indicating that iodine deficiency is no longer a public health problem at the national level. With regard to **fluoride**, 50% of the population overall has intake levels below the values recommended by WHO; exceptions are the populations of Managua, Moyogalpa, Tisma, and La Cruz de Río Grande.

In 2003, the prevalence of **diabetes** was 8.1% (67) (8.3% among women and 7.9% among men), with higher figures in older age groups (2.8% among those aged 20–39, 17% among those aged 40–64, and 22% among those over 65). In 2005, mortality from diabetes mellitus was 18.9 per 100,000 population

(compared to 8.9 per 100,000 in 1992), and the majority of the deaths occurred in the over-50 age group. In the population aged 60 and over, more women than men died from diabetes (245.2 per 100,000 population versus 193.6 per 100,000 population) (68).

Cardiovascular Diseases

Between 1996 and 2004, the proportion of deaths from diseases of the circulatory system showed an upward trend, rising from 23% to 26% (68). These diseases continued to be the leading cause of death, with rates of 76.9 per 100,000 population in 1996 and 71.4 per 100,000 population in 2004. The death rates in 2004 were higher among men (74.7 per 100,000) than among women (68.1 per 100,000). The main reported causes were: **acute myocardial infarction** (43%), **stroke** (27%), and **hypertensive disease** (12%). Men accounted for 52% of the deaths, with more than half dying from acute myocardial infarction (56%). Among women, the leading cause was stroke, which accounted for 52.4% of female deaths. According to a 2003 study, the prevalence of hypertension was 25% (25.4% among women and 24.7% among men), and prevalence rose with age (13.5% among those aged 20–39 and 61.8% among those over 65 years of age); newly detected cases made up 9.8% of those figures (23.4% in the population over 65 years of age). The most frequent risk factor was overweight, present in 65.6% of cases (71.4% among women and 59% among men); 80.8% of those with hypertension between the ages of 40 and 64 were overweight, and obesity was a factor in 28.3% of cases. The prevalence of hypercholesterolemia was 19.7% (21.1% among women and 18.1% among men; 31.9% were between the ages of 40 and 64) (69).

Malignant Neoplasms

The proportion of mortality due to malignant neoplasms has increased (7.6% in 1990, 9.7% in 1996, 10.5% in 1999, 11.7% in 2002, and 12% in 2004). Cancer remained the third leading cause of death over the last five years. The specific death rate from this cause rose from 31.2 per 100,000 population in 2000 to 35.2 per 100,000 population in 2004. By site, stomach cancer accounted for 12.5% of all cancer deaths, cervical cancer for 10.5%, and breast cancer for 4.9%. In 2004, cancer mortality was higher among women (38.4 per 100,000) than among men (30.4 per 100,000). Cervical cancer was the leading cause of cancer death among women, and, together with breast cancer, accounted for 18% of all reported deaths from cancer (70). The prevalence of detected cervical cancer was 13.7 per 100,000 women over the age of 15 in 2001; it rose to 13.9 in 2002. The prevalence of breast cancer was 5.2 in 2001, rising to 5.8 per 100,000 women over the age of 15 in 2002 and affecting mainly women over 50. During the period 2000–2005, cervical cancer was the leading cause of morbidity among patients treated at the National Radiotherapy Center, followed by breast cancer (17.2% of cases) and cancer of the digestive and hematopoietic systems (7.3% of cases each) (71). Access to diagnostic and treatment services is limited.

In 2002, the estimated incidence of malignant neoplasms among men was 12.2 per 100,000 for lung cancer and 24.1 per 100,000 for stomach cancer. Among women, the estimated incidence of malignant neoplasms was 47.2 per 100,000 for cervical cancer, 23.9 per 100,000 for breast cancer, 17.6 per 100,000 for stomach cancer, and 5.5 per 100,000 for lung cancer.

OTHER HEALTH PROBLEMS OR ISSUES

Disasters

Since Hurricane Mitch (1998), some 13 natural phenomena have occurred (heavy rains, floods, earthquakes, droughts, and other hurricanes), creating disaster situations and exacerbating existing environmental vulnerabilities. In 2004, a massive landslide in the area around Musún Mountain, caused by intense rainfall, claimed 125,000 victims, approximately 4,800 of whom lost their homes. At the other extreme, drought affected mainly the Atlantic region, further worsening food insecurity. The immediate consequences of these disasters were overburdening of health services, increased incidence of diarrheal diseases owing to contamination of water supplies, and higher rates of respiratory and vector-borne diseases. The most affected population groups were children, the elderly, and pregnant women.

Violence and Other External Causes

The contribution of injuries to total mortality has remained about the same in recent years: 14% in 1996 and 13% in 2004. However, a steady rise in violent injury, rape, and suicide was noted. It is estimated that 30% of women between 15 and 49 years of age have at some time been physically abused by their partners (72). A 2004 study conducted in five Nicaraguan hospitals (73) revealed that injuries accounted for 18% of all emergency room visits; 35% were for falls, 23% for assault by bodily force, 12% for transport accidents, 12% for stabbings, 3% for poisoning, 2% for burns, and 1% for firearm injuries. Burns (36%), poisonings (33%), and firearm injuries (31%) accounted for the highest rates of hospitalization, and firearm injuries (17%), poisoning (14%), and traffic accidents (12%) accounted for the highest case fatality rates. The injuries causing the most premature deaths were those resulting from traffic accidents (2% case fatality), the main causes of which were alcohol consumption (9% of drivers) and failure to use a helmet, seatbelt, or child car seat (only 0.9% of traffic accident victims were wearing a seatbelt). Accidents involving bicycles (33%) and cars and trucks (18%) also produced significant numbers of injuries. The burden placed on hospitals was very heavy, in terms of both inpatient and outpatient care, raising health care costs (74). Almost half of burn injuries involved children under 10 years of age and were associated with contact with hot liquids, food preparation, use of household appliances, burning of waste, housing conditions (in many cases precarious, with a single room serving as kitchen, liv-

ing room, and workplace), not wearing shoes, and family negligence. Burns occurring outside the home were associated with unsafe handling of explosives and, in occupational settings, with unsafe practices in welding and use of electricity (75).

Mental Health

Demand for care in mental health facilities in 2004, expressed as rates of care provided per 100,000 population, was 145 in outpatient facilities, 19 in psychiatric hospitals, 3.4 in day treatment facilities, and 0.34 in community-based hospital psychiatric units (76). Of the population receiving care in outpatient mental health facilities, 60% were female and 40% were male. By age groupings, 8% were children and adolescents. The leading diagnoses in psychiatric hospitals were schizophrenia (36%), mood disorders (21%), and substance abuse (17%). In community-based psychiatric units, neuroses (70%) and substance abuse (13%) were the most common diagnoses, while in outpatient care facilities, neurotic disorders (44%) and schizophrenia (12%) were the most frequently diagnosed conditions. Attempted suicide has shown a rising trend, as have suicide deaths. More than half of all self-inflicted injuries occurred in the 15–24 age group; 22% were associated with alcohol use and 84% with pesticides use, particularly phosphine, as a means of intentional self-poisoning (39). Suicide and attempted suicide among pregnant young women are important causes of maternal morbidity and mortality.

Grisi siknis (“crazy sickness”), a culture-bound syndrome associated with various manifestations of mental illness, occurs in the Atlantic coastal regions. The disease is currently under study, and no conclusive data are available as of yet. Outbreaks of the illness—marked by aggressive behavior, hallucinations, and convulsions—occur sporadically and have gained notoriety over the last five years as cases have been reported in one or more community almost every year. In 1999, cases were reported in Bilwi (North Atlantic Autonomous Region) and in Raiti (Jinotega). In early 2004, the communities of San Juan de la Bodega, Florida, Bulkian, Leymus, Tusku Tara, Santa Fe, and Santa Isabel, in the municipality of Waspam, and Wawa Bar, in the jurisdiction of Puerto Cabezas (North Atlantic Autonomous Region), were affected. It has been suggested that this ailment may be a sequela of war or that it may be linked to the exacerbation of famine in the North Atlantic areas. In 2004, in one of the most studied outbreaks, a total of 100 cases were reported in Walakistan, a community of 1,200 inhabitants (hence, 8% of the population was affected); half of those cases showed severe symptoms, which were treated with traditional medicine techniques.

Addictions

According to a 2005 survey, 78.7% of men and 43.8% of women in Nicaragua have consumed alcohol at some time in their lives; of those numbers, 21.9% reported having consumed alcohol in the year preceding the survey (77). Between 1992 and

1996, hospital-based epidemiological surveillance systems found the following lifetime prevalence of use figures: tobacco (36.5%), alcohol (42%), tranquilizers (16%), marijuana (6%), cocaine (1%), crack (0.5%), and inhalants (1%) (78). During the same period, the prevalence figures found in detection centers doubled for tobacco and alcohol, remained about the same for tranquilizers, and increased by 5–15 times for other drugs.

Environmental Pollution

In 2005, 1,332 cases of acute pesticide poisoning were reported (rate of 2.43 per 10,000 population), with 153 deaths (mortality of 2.79 per 100,000 population and case fatality rate of 11.5%) (79), but these figures only hint at the magnitude of the problem. In 2001, a national study estimated underreporting of cases at 98%, yearly incidence at 2.3%, and the annual number of cases at 67,868 (80). Several studies have found cases of delayed polyneuropathy in agricultural workers exposed to methamidophos, chlorpyrifos, and malathion (81–85); fertility problems linked to exposure to dibromochloropropane; and chronic effects of exposure to paraquat (86). In Managua, lead poisoning rates of 50 per 1,000 were reported in children living near small battery repair shops (87). In rural water systems in some municipalities in the northern and central parts of the country, arsenic concentrations exceeded permissible levels (88). The accepted standards are < 0.01 mg/l for drinking water and < 0.05 mg/l for safe water. Concentrations of over 0.05 mg/l were found in 8% of samples from Nueva Segovia and in 5.4% from Madriz. Previous studies carried out in Valle de Sébaco, Matagalpa, found levels so high that rural wells had to be closed. Arsenic poisoning cases have been reported in several communities, as have significant chronic effects in the exposed populations.

Oral Health

The development of oral health in the country has been described as “emergent,” and a National Salt Fluoridation Program is being implemented (89). The prevalence of dental caries among children aged 6–15 years was 85% in 1999 (90). A 2005 study carried out in indigenous communities of the Atlantic region indicated that the caries rate in temporary teeth was higher among males. Children aged 6–12 years had the highest average amount of bacterial plaque, followed by children under 5 years of age. All dental caries indicators showed a straight-line increase with age (91).

Occupational Accidents and Diseases

The level of undercounting of occupational accidents by the Nicaraguan Social Security Institute (INSS) was 93%–98% in the primary and tertiary sectors of the economy and 64% in the secondary sector (92), and the Ministry of Labor reports 30% fewer cases than the INSS. The number of reported occupational accidents decreased from 14,864 in 2001 to 12,902 in 2004, for an accident rate of 4.8% in 2004, the majority of these events

TABLE 2. Principal health challenges and priority areas for action, Nicaragua, 2004–2015.

Health sector challenges	Problems
<ul style="list-style-type: none"> • Channel investment to the health sector • Increase health care coverage • Shift the sector's focus and activities toward a health promotion and disease prevention approach • Stimulate social participation in health promotion and protection issues • Create sectoral coordination mechanisms • Implement decentralization • Improve managerial capacity • Develop human resources • Implement a new services delivery model • Seek new sources and mechanisms 	<p>Group 1:</p> <ul style="list-style-type: none"> • Maternal mortality • Infant mortality • Malnutrition <p>Group 2:</p> <ul style="list-style-type: none"> • Diarrheal and acute respiratory diseases • Vector-borne diseases (malaria, dengue, tuberculosis, Chagas' disease, leishmaniasis) • HIV/AIDS and other sexually transmitted infections <p>Group 3:</p> <ul style="list-style-type: none"> • Disability • Mental health • Violence and injuries • Occupational accidents and diseases <p>Group 4:</p> <ul style="list-style-type: none"> • Noncommunicable diseases (diabetes, hypertension, cervical cancer)

Source: National Health Plan (2004–2015).

concentrated in the secondary sector. In that year, the most frequent occupational injuries were bruises (41%) and puncture wounds (25%). According to the Ministry of Labor, between 2000 and 2005, 183 fatal accidents were reported, yielding an average of 37 deaths per year; 25% of them occurred in the manufacturing sector and 20% in the construction sector (93). The case fatality rate for occupational accidents remained at 0.35% during the period (93).

Occupational diseases are also highly underreported. In 2004, the INSS reported 235 cases. The most frequent specific pathologies were functional dysphonia (31%), hypoacusia (19%), and carpal tunnel syndrome (8%). In addition, eight cases of byssinosis (2%), three of silicosis (1%), and three of asbestosis (1%) were reported (94). Chronic diseases related to exposure to dibromochloropropane and an epidemic of chronic kidney failure were reported among agricultural workers in the western part of the country. A high prevalence of disability due to decompression syndrome has been noted in Miskito divers along the Atlantic coast. A study undertaken by PAHO, the University of the Autonomous Regions of the Nicaraguan Caribbean Coast, and the Institute of Traditional Medicine and Community Development in September 2005 found that there were between 2,500 and 3,000 active divers in 2000, based on data from the International Labor Organization. By 2005, according to the divers' union SIBURAAN, the number of divers in the two autonomous regions had risen to 6,000. Based on information provided by 15% of the divers' families, it is estimated that 1,000 people are currently suffering permanent disability as a result of decompression syndrome. Of a sample of divers interviewed, 19.5% reported some sequela of decompression syndrome.

RESPONSE OF THE HEALTH SECTOR

Health Policies and Plans

The National Health Policy (2004–2015) (95) establishes the following general policy objectives: expansion of the coverage and improvement of the quality of health services, strengthening of the primary health care strategy, promotion of good governance in the health sector, consolidation of the national health system, strengthening of managerial capacity, development of human resources, and implementation of innovative strategies in the autonomous regions of the Atlantic coast and in border municipalities.

The National Health Plan (2004–2015) (95) is the fundamental tool for carrying out recently formulated national policies. Its aim is to ensure the right to equitable and universal access to a set of basic health services designed to increase the population's life expectancy and quality of life. The plan seeks to promote the adoption of healthy habits and practices of individuals, families, and communities, to expand social participation, to improve user satisfaction, and to enhance equity in the financing of health care, prioritizing vulnerable groups (extremely poor, rural, ethnic, and indigenous populations). To implement the plan, it is necessary to increase the response capacity of the health sector and ensure the sustainability of activities. Table 2 summarizes the main health problems and challenges in Nicaragua.

An evaluation of the health policies implemented between 1997 and 2002 (96) found that while health indicators had improved for the country as whole, these advances had not extended to the areas with the least access to health services or to the lowest income households. The financial risk to individuals

associated with health care has increased as the share of private spending in total health financing, the percentage of people paying out-of-pocket for care, and the amounts paid have grown. The lowest income strata have been hardest hit by these conditions. No significant change in user satisfaction was found during the six-year period under consideration.

The issue of medicinal drugs in Nicaragua is critical. A national policy formulated in 1996 promotes access to essential drugs and use of generics, and strategies are being developed to expand access to essential and low-cost generic drugs and reduce prices. Regulation policies are also being formulated. However, the restrictions imposed by free trade treaties and customs union agreements have negatively impacted policies on access to drugs.

Performance of the essential public health functions (EPHF) was measured in Nicaragua in 2001 (97), and the country received a total score of 0.49 (on a scale of 0 to 1, with 0 being the lowest score and 1 the highest). The lowest scores were in the areas of public health research (0.15), ensuring and improving the quality of health services (0.17), and evaluation and promotion of equitable access to necessary health services (0.29). The most recent EPHF assessment was carried out in Managua (98), which received a total score of 0.53, the lowest scores being in the areas of public health regulation and enforcement (0.21), health research (0.24), and quality of services (0.25).

The health sector is currently engaged in a process of decentralization. The 17 SILAIS (one per department or region) are the providers and managers of health care at the subnational level. They organize and coordinate units at the primary and secondary levels, carrying out functions that include enforcement of the regulatory framework, public health surveillance, management of resources and establishments, oversight of the provision of care, and promotion of social participation in health. The statute governing the North Atlantic and South Atlantic Autonomous Regions gives them responsibility for participating in the formulation and execution of development plans and programs, administering health programs, and implementing their own economic, social, and cultural projects. The Ministry of Health and the Regional Councils of the two autonomous regions have entered into a collaboration agreement aimed at strengthening the Regional Councils and respective local governments for the transfer of resources, competencies, and responsibilities for the health of their respective populations. The North Atlantic Autonomous Region has its own health model and has made the greatest headway in this regard.

Close to 40% of Nicaraguans lack access to health services, and the 60% that do have access to services often find the care to be of poor quality. Among Afro-descendent and indigenous populations (Creoles/Blacks, Miskitos, and Mayagnas), the proportion lacking access to health services is estimated at more than 75% (99).

The results of a 2001 survey indicate that patients who seek care in health services operated by the Ministry of Health come

mainly from urban areas and from the non-poor segment of the population. More than 50% of those participating in the survey said that they did not seek care when they were sick (the proportion is higher in rural areas and among the male population). The main reasons cited for not seeking care were knowledge of the illness (41%), lack of money (18.5%), mildness of the illness (16.4%), distance to the health care center (5%), and poor quality of care (3.6%) (100).

In 2004, the vast majority of workers (92.3%) were not covered by social security. Among rural workers, 93.6% were not affiliated with the INSS, and among urban workers, 78% were not insured. Of the workers who were covered by social security, 36.8% were in the commercial sector, 22.4% in the services sector, 14.6% in the agricultural sector, and 13.4% in the industrial sector.

The National Health Plan has nine objectives: to increase survival and quality of life among women of childbearing age; to increase survival and quality of life among children under 5 years of age; to improve nutrition among children under 5 years of age; to prevent and control diseases in general; to promote knowledge of healthy attitudes and practices among individuals, families, and communities; to reduce the incidence of accidents, disabilities, occupational diseases, and mental disorders; to reduce the incidence of risk factors associated with temporary and permanent disability; to increase survival among older adults; and to promote healthy community environments. Health programs are organized with a view to achieving these objectives, with a priority focus on services for women, children, and adolescents (family planning, prenatal and puerperal care, growth and development monitoring, immunization, integrated management of childhood illness, and sexual and reproductive health). Disease prevention and control programs stress vector-borne diseases, HIV/AIDS, tuberculosis, and, to a lesser extent, chronic diseases, environmental health, toxicology, and occupational health.

The Five-year Plan 2005–2009 identifies three objectives for institutional development: (a) extension of coverage and improvement of the quality of care, especially for populations without access to services or for whom access is difficult, rural populations, deprived populations, and indigenous communities; (b) strengthening of the health services system, including physical rehabilitation and equipping of facilities, functional organization and articulation of networks of services, and improvement of the management of primary and secondary care facilities; and (c) strengthening of governance, complemented by processes of decentralization and deconcentration.

Implementation of this plan presupposes the introduction of a new health care model, the conceptual framework for which has already been defined (101), although discussion of the economic viability of the two options—a comprehensive model versus a targeted model—is ongoing.

Since 2002, changes in the health system have been rooted in General Health Law #423 and its respective regulations, which establish the institutional and functional activities of the Ministry

of Health, its governance role, and the principles underlying the comprehensive health care model and the provision of services in the public system (promotion, prevention, recovery, and rehabilitation); the regulations concerning the delivery of services by the private sector and the social security system; the provision of public health services; environmental sanitation; regulation of health products and services; and administrative, safety, and emergency measures.

Organization of the Health System

The system is made up of a public sector and a private sector. The public sector consists of the Ministries of Health, Interior, Defense, and the Environment and Natural Resources; the Nicaraguan Social Security Institute; and other state institutions that carry out health activities. In the context of the Government's overall strategy to reduce poverty, the Ministry of the Family and the Fund for Emergency Social Investment focus on vulnerable population groups. The private sector is subdivided into for-profit and nonprofit subsectors.

The Ministry of Health is the main supplier of health services and is by law the lead institution in the sector. It carries out essential public health activities benefiting the entire population, and it also provides individual health care for the vast majority of the uninsured. The Ministry is currently engaged in a process of institutional reorganization, in the framework of the State reform initiative launched by the national Government several years ago. The new functional organic structure of the Ministry of Health is intended to enhance its regulatory capacity, decentralize administration and reduce bureaucracy, eliminate duplication of functions, improve the linkages between management and services, integrate information systems, strengthen implementation and follow-up of plans, reallocate and target health system financing in order to better meet the needs of priority groups, facilitate the development of a new model of comprehensive care with a preventive focus, and increase the coverage of the services system.

The primary insurer is the INSS, which provides health care to its beneficiaries and their dependents through 49 private health care providers (*Empresas Médicas Previsionales*, or EMPs) from which it purchases services. The INSS does not have its own health care establishments, but it has spurred the development of the private sector by contracting for services with EMPs, many of which operate out of public facilities, affecting the availability of public resources through their use of buildings, resources, indirect subsidies, etc. Disbursements by the INSS are made on the basis of the services purchased from the EMPs under a prepaid health care model.

Information on the private subsector is limited. A total of 203 private health facilities have been identified (102), including both for-profit and nonprofit entities. Some are independent, and some are organized into networks (e.g., PROFAMILIA). They are concentrated in Managua and, to a lesser extent, in Chinandega,

Matagalpa, Estelí, and León. The overwhelming majority of private facilities are located in Managua; eight are hospitals, with a total of 250 beds, and the rest are outpatient care clinics.

The Ministry of Health has registered 90 nongovernmental organizations (NGOs) that offer a variety of health services, with differing degrees of specialization. National and international NGOs have the capacity to provide services on a national scale, mainly in conjunction with community-based activities, in some cases covering areas not reached by public services (such as the organization *Acción Médica Cristiana* in the Atlantic coastal region). The community subsystem is made up of networks of community health workers, midwives, and other volunteers who work in their respective communities. The subsystem includes basic health care centers and maternal health care centers, which play a central role in promoting health, as called for under the new National Health Plan.

Responsibility for the provision of health care is distributed as follows: Ministry of Health, 60%; INSS, 7.7% (including beneficiaries and their spouses and children under age 12); and private institutions, 4%. Civil servants and members of the armed forces have their own health care services.

In 2004, the INSS had 348,200 affiliates (103), which, based on a working population of 1,973,100 individuals, made its coverage 17.7%. Adding all family beneficiaries brings the total number of individuals covered by the INSS to 427,139, which is approximately 7.7% of the total population, as noted in the preceding paragraph. However, not all INSS beneficiaries have comprehensive illness and maternity coverage. If the services offered by the Ministry of Health and by the INSS are compared, it is evident that the care provided to the insured and the uninsured populations is very different: the Ministry provided 1.47 medical visits per person, 1.13 prescriptions per visit, and 5.6 hospitalizations per 100 population, whereas the INSS provided 5.18 medical visits per beneficiary, 1.9 prescriptions per visit, and 9.84 hospitalizations per 100 beneficiaries.

Health care for the various ethnic groups (indigenous peoples and Afro-descendant communities) is limited by geographic, cultural, and economic barriers and by marginalization and lack of information. The provision of services to these communities poses serious difficulties for providers and, even more so, for health services users. Care is provided largely by personnel performing their social service who have not been specially trained to work in these areas; most are male and do not speak the local languages of the Atlantic communities, which breeds mistrust among the population, especially women who are thus doubly excluded. At the national level, there is no specific unit that is responsible for the health care for these populations, although the creation of such a unit has been proposed in a draft law on traditional medicine and alternative therapies. Law #28 establishes that knowledge of natural medicine is to be compiled and preserved in a scientific manner and in coordination with the health system.

Public Health Services

Primary health care was adopted as a health policy in 2004, and it is also being incorporated into the new model of comprehensive care, with emphasis on family and community health, and on the implementation of innovative strategies for the Atlantic coastal region. The development of health promotion is still incipient, and intersectoral coordination and citizen participation still need to be strengthened. Nevertheless, there are initiatives to promote healthy schools, healthy workplaces, and healthy municipalities. Some health issues are being addressed through networks (of women, of workers, for children, etc.).

Priority has been given to programs oriented towards the prevention and control of HIV/AIDS and other sexually transmitted diseases; vector-borne diseases; chronic diseases, such as hypertension and diabetes; immunization; and health of women, children, and adolescents. Most of these programs have been launched by the Ministry of Health, with support from community organizations and NGOs. However, budget problems and limited resources in general have resulted in low coverage and in service quality that is far from optimal. In 2004, service production statistics for maternal and child health programs indicated low percentages of coverage with pentavalent vaccine and live polio vaccine (OPV3) among children under 1 year of age (79.4% and 79.8%, respectively), and somewhat better coverage with tuberculosis (BCG) vaccine in the same age group (87.6%) and trivalent measles-mumps-rubella (MMR) vaccine among 1-year-old children (84.3%) (36). The proportion of births attended in health care facilities in 2004 was also low overall (51.6%), and the figures were even lower in the Atlantic coastal area. Prenatal care coverage fell from 75% in 2000 to 66% in 2004 (with only 34.4% initiating prenatal care in the first trimester of pregnancy). The proportion of women receiving postpartum care has remained virtually unchanged over the last five years (50.1% in 2000 and 50.7% in 2004).

Although it was a difficult process, a new health information system has been organized and is now functioning. The system comprises seven integrated subsystems: health regulation, planning, services production, health situation, supply of technical and material resources, human resources, and management of projects and financial resources. The traditional information system has been maintained, although it does not integrate sector information and exhibits technological limitations. The information obtained is used for descriptive purposes and, in some cases, is linked to monitoring and evaluation of services. Nevertheless, there is a clear need for significant enhancement of the country's capacity for information analysis.

The Nicaraguan National Epidemiological Surveillance System is also functioning. This system focuses in particular on communicable diseases and reportable events, such as maternal deaths, compiling epidemiological information collected weekly by the health units of the 17 SILAIS. The great majority of public health reference laboratories (including the bacteriology, virology, parasitology, and food-testing laboratories) are located

within the National Diagnostic and Reference Center in Managua. For specific types of laboratory work, the Center collaborates with university centers, such as the one at the Autonomous National University (UNAN) in León (for enteric viruses) and the center at UNAN in Managua (for aquatic resources).

The national drinking water company administers more than 500 electrically powered wells, whose operating and maintenance costs have presented challenges as regards the capacity to ensure continuous delivery of services (104). In 2004, national drinking water coverage was 74.5%. In urban areas, the level was 92.9%, albeit with significant limitations in quantity, continuity, cost, and quality. In rural areas, coverage was 48.6%, with a trend towards deterioration of water systems and lack of support for the management of local drinking water committees (10, 105). More than half (53.3%) of water supply sources were contaminated, especially in rural areas.

Per capita production of solid waste in 2003 was 0.585 kg/person/day, for a total of around 3,000 metric tons daily of household solid waste. Seventy-eight percent of municipalities had solid waste collection services, but only 18% of the waste collected was being disposed of in sanitary landfills (106), and only 35% of the urban population was served by sewerage systems (29). Only five of the 151 municipalities have adequate procedures for the elimination of solid waste, and there is no nationwide program for sorting or recycling of solid waste. Seventy percent of urban waste is not disposed of properly (107), and hospital waste also is not managed properly (108).

The main source of air pollution in Managua is vehicle emissions. Levels of ozone and particulates exceeding the WHO air quality guidelines have been found. The vehicle fleet numbered 102,024 units in 1999, and it is estimated to be growing at a yearly rate of 5%–10%. In rural areas, the use of firewood for cooking and heating is the main cause of indoor air pollution (29).

The Ministry of Environment and Natural Resources (MARENA) is the lead regulatory agency charged with implementing environmental policy and enforcing environmental laws (109). A National Environmental Information System has been established and is coordinated by an environmental coordinating body and a network of 16 institutions and regional bodies. Fifty-two environmental indicators are currently monitored in 10 key thematic areas (water, natural threats, biodiversity, environmental pollutants, energy, forest resources, mines, fisheries, soil and land use, and tourism) (110).

Nicaragua became a signatory to the Stockholm Convention in 2001 and is currently engaged in a project entitled "Initial Assistance to Enable Nicaragua to Fulfill Its Obligations under the Stockholm Convention on Persistent Organic Pollutants" (Global Environment Fund [GEF]/MARENA), aimed at strengthening national capacity to carry out the obligations arising from the Convention. The DDT/GEF project (Ministry of Health/PAHO) seeks to reduce the use of chemicals for malaria control and includes a component for the elimination of DDT in the country.

The Ministry of Health has a center for information, surveillance, technical advice, and toxicological assistance that offers workers' health programs and incorporates the National Toxicology Center and a toxicology testing department. The Pesticides Program, with national coverage, carries out health promotion and acute pesticide poisoning prevention and control activities.

Activities to alleviate the situation of food and nutrition insecurity in Nicaragua are oriented mainly towards strengthening public policies and formulating a national food and nutrition security agenda, in addition to improving national and local capacity to analyze and address food and nutrition issues and ensure food and nutrition security at the local level. This entails the identification and assignment of priority to the most vulnerable municipalities, sensitization, municipal and community organization and strengthening, introduction of food and nutrition security issues on the agendas of local governments, ongoing training for municipal stakeholders and sectors (including the respective communities), and strengthening of the capacity of health workers at the local level for the prevention and treatment of the main forms of malnutrition, especially among women and children. With regard to public policy, the Technical Commission for Food and Nutrition Security has been reactivated with the participation of Government agencies, NGOs, universities, and representatives of civil society, as well as international cooperation agencies. Thus far, a national policy on food and nutrition security, a national law on breast-feeding, and technical standards for micronutrient fortification of foods (e.g., iodized salt, iron-enriched wheat flour) have been adopted.

Regulatory schemes have been put in place for disaster prevention and response (111, 112), and corresponding sectoral regulations (113, 114) and methodological guidelines for the health sector have been issued (115, 116). The National Disaster Prevention System comprises the National Committee for Disaster Prevention, Mitigation, and Response; national Government agencies and institutions; and committees at the departmental, municipal, and autonomous region levels. In recent years, the country has made significant strides in the establishment of an intersectoral network for emergency preparedness and alert and for mitigation and timely response. The Ministry of Health has designated disaster focal points in the SILAIS, developed local health emergency plans and hospital emergency plans, drawn up lists of essential inputs for various types of disasters, trained personnel, and carried out intersectoral coordination.

Individual Care Services

The network of services operated by the Ministry of Health includes 1,039 outpatient care units and 32 hospitals. In Managua, there are 16 departmental hospitals, in addition to specialized hospitals in the fields of pediatrics, obstetrics/gynecology, surgery, and ophthalmology. The hospitals in León and Managua serve as teaching hospitals. The most recent survey of health fa-

cilities conducted by the Ministry of Health (in 2001) identified 203 private establishments, including 5 hospitals, 99 clinics and polyclinics, 41 EMPs, 49 clinics associated with NGOs, and 9 maternity clinics. At the primary care level, health promotion, disease prevention, and basic recovery services are offered in 97% of facilities (82% in health posts and 18% in health centers). Outpatient care services provide care through preventive programs, outpatient visits, and emergency visits, while hospitals provide emergency and inpatient care. The secondary level comprises departmental hospitals and national referral hospitals, and the tertiary level, national centers for cardiology, radiotherapy, ophthalmology, dermatology, psychiatry, and laboratory services (the National Diagnostic and Reference Center, an agency of the Ministry of Health). In 2004, 1.8 outpatient visits, 1.2 medical consultations, and 0.07 dental visits per person were provided (36). With regard to hospital services, the number of beds available per 10,000 population was reported to be 8.9, with an occupancy rate of 68%; the duration of the average hospital stay was four days.

Laboratory, radiology, and ultrasound equipment is insufficient at the secondary and tertiary levels, in spite of recent investments. Existing equipment and facilities tend to wear out and/or reach the end of their useful life, with insufficient money available to maintain and/or replace them, even in the private sector. In 2004, there were 20 blood banks affiliated with the Ministry of Health and four with the Red Cross, distributed throughout the country (at least one in each department). That same year, 33 transfusions centers were operated by the Ministry of Health, 10 by private services, and one by the Red Cross. These centers perform screening tests to detect HIV, hepatitis B surface antigen (HbsAg), hepatitis C virus, syphilis, and Chagas' disease. The Transfusion Security Law, enacted in 1999, promotes voluntary donation. In 2004, 48,713 donations were collected; 55% were from replacement donors, and 45% were from volunteer donors.

There is a national program, a hospital, and a network of services and therapeutic activities offered by NGOs for children with disabilities, although a much larger volume of resources is needed to be able to provide adequate assistance for the more than 600,000 persons with disabilities currently estimated to be living in the country.

Nicaragua has no gerontology services as such, and 90% of older adults are not covered by social security. A scant 0.4% of this group has private insurance coverage. The Ministry of Health recognizes that it is not equipped to provide appropriate care for older adults, especially in the areas of medications and rehabilitation for chronic conditions, without negatively impacting other disease control and hospital services. The social security system promotes care for chronic conditions and offers some programs for retirees, but they are mainly recreational programs (13). The Ministry of the Family has a specific program for seniors that includes technical advisory services for public and private centers; health care; recreational, cultural, and occupational activities; and awareness-raising among the general population.

A network of dental services exists at the primary care level (125 services distributed across 77% of the country's municipalities), but these basic services are only reaching 50% of the population, and have limited capabilities due to deterioration of equipment and insufficient availability of supplies and materials (117).

Although the country still has no specific policies or legislation on mental health, there are some plans in effect and interventions have been designed for disaster situations. A national program for integration of services exists within the Ministry of Health, and there is one psychiatric hospital in operation (with the equivalent of 2.98 beds per 100,000 population), five day-treatment facilities, and three community-based psychiatric hospital units (supplying 0.3 beds per 100,000 population). However, the INSS does not cover psychiatric disorders, and the supply of drugs is insufficient. In addition, there is tremendous inequality in access to mental health services for ethnic minorities, as is clearly evidenced by the fact that in the entire Atlantic coastal region (comprising both the North Atlantic Autonomous Region and the South Atlantic Autonomous Region) there is a single psychiatrist for a total population of 620,640 (76).

The UNAN Center for Research on Health, Work, and the Environment, based in León, offers occupational health services and provides specialized training in occupational health for technicians and professionals (graduates, with master's degrees and clinical residencies). Several large companies also have occupational health services, and the INSS has an Occupational Risks Management Department.

Health Promotion

Relatively little progress has been made with respect to an intersectoral approach to determinants of health, as evidenced by the scant attention accorded to such determinants in the five-year health plan. However, citizen participation in public affairs has acquired the standing of a constitutional right. The National Health Council, an entity organized under the Ministry of Health to stimulate dialogue and joint collaboration between the public and private sectors, has been strengthened, as have municipal health councils, and in the North Atlantic and South Atlantic Autonomous Regions, Regional Health Councils exist as part of the legislative branch of government. At the local level, community development committees function as self-management bodies for local development projects (drinking water supply, construction of latrines, energy, etc.).

With a view to improving occupational health, the Ministry of Health has promoted (as have other Central American countries) the use of a "toolbox for creating healthy working environments." The Ministry of Labor designed the National Strategic Plan of Action for Occupational Health and Safety with the support of the National Council on Occupational Health and Safety, but the Ministry needs to increase its institutional resources in order to expand coverage. The workers' health network has been consoli-

dated and is currently functioning as a commission of the National Council on Occupational Health and Safety with ongoing participation by the various Ministries concerned (Health, Labor, Education), INSS, universities, and labor unions.

In the area of child health, in 2005 a network for the development of healthy environments for children was formed, involving more than 20 organizations (Government ministries, universities, private sector, and unions), which carried out a situation assessment of child vulnerability, presented a policy proposal, and designed various educational materials.

Health Supplies

The 22 laboratories that manufacture drugs as third-tier producers are nominally national firms, but they import the entirety of their raw materials. There are also 83 drug importers and distributors, three of which account for 93% of total imports (US\$ 113 million in 2004). Between 1993 and 2002, the number of registered pharmaceutical products increased 600% (from 2,061 products to 12,546). The proportion of generic drugs increased from 13% in 1993 to 26% in 2001. There are only 51 registered pharmacists, and not all units in the network of services have pharmacists on staff. The Ministry of Health suffers from a significant shortage of medical inputs for the various diagnostic and treatment services, which affects surgical services in particular.

The health units of the Ministry of Health at the primary care level have an inventory of 1,681 pieces of equipment, of which 75% are in good operating condition. Sixty-one percent of health posts have refrigerators, 28% have ice chests, and 82% have thermal containers for vaccines. As for the availability of telecommunications, only two-thirds of health centers with beds, half of health centers without beds, and one-fourth of health posts are equipped with radio and telephone services. Two-thirds of health centers with beds and just 3% of health posts have emergency transport means (13).

Human Resources

In 2004, there were 3.8 doctors, 3.1 nurses, and 0.5 dentists per 10,000 population (36). It was estimated that there were 0.9 psychiatrists, 2.1 psychologists, 0.57 social workers, and 0.07 occupational therapists per 100,000 population (76). In 2005, of all Ministry of Health human resources, 60% were assigned to direct care and 40% to services management (administration, instruction, and executive management). The average age of the country's health workers is 40, and 63% have held their jobs for more than 10 years. Health workers are concentrated in the capital and in the Pacific region, and are less abundant in the Atlantic region and the rest of the country. In the Atlantic region, nurses provide 88% of outpatient care and 74% of health personnel are women (93% of nurses, 86% of nursing auxiliaries, 76% of laboratory technicians, 52% of physicians, 37% of hygienists, and 21% of vector control

technicians) (118). Training of health personnel is carried out in nursing schools and in seven public and private universities. The principles that should guide training for the health professions are currently being defined. The Ministry of Health is promoting a process of continuing education for health personnel.

Despite staff reduction policies implemented since 1990 (which resulted in a decrease of 18% between 1990 and 2003), the Ministry of Health remains the main employer of health professionals. Little information is available on the health workforce in the private sector. The latest survey of health facilities yielded above-average numbers of professionals in the private sector in comparison with Ministry of Health personnel in the fields of pediatrics, gynecology and obstetrics, and technical and administrative services.

A deficient salary policy for the health sector in the last two decades has meant low wages, and health workers have resorted to collective bargaining in order to improve their incomes, negotiating 15 incentives since the 1980s. This modality does not solve the problem, however, and generates distortions, since the incentives represent more than half of earnings, while the base wage makes up scarcely one-third of the total earned. This situation gives rise to constant grievances and prolonged strikes. A draft law on health occupations, with a new salary policy, is currently being drawn up.

Research and Technological Development in Health

The Department of Health Research and Education is responsible for formulating a national research plan and coordinating with training institutions and bioethics committees. Progress has been made in developing a research regulatory scheme and in drafting specific standards. The Ministry of Health, together with the academic community, has begun to put together a health research agenda.

Researchers are trained in the schools of public health in Managua and León. Most research is conducted without oversight by a bioethics committee (except in León and except for some larger-scale studies). Most of the results are published only as gray literature—i.e., they are never formally published and their distribution is limited—which restricts their application and follow-up. No regulatory policies are currently in place for the incorporation of new technologies or for technology assessment and development, nor is there a policy or strategy on information management. The main source of access to information is the National Health Library, which is linked to a network of documentation centers and virtual libraries.

Health Sector Expenditures and Financing

Health financing comes from a three-part mixture of the public sector (35.8%), the private sector (52.8%), and external cooperation (11.4%) (119). The amount available from public sources and

from external cooperation has tended to decline, while private funding has increased, driving up household spending. Between 2001 and 2003, expenditure for preventive and public health services made up 9.3%, 8.2%, and 7.3% of total health spending, reflecting a downward trend in this type of expenditure as a proportion of the overall health budget. Medical inputs account for the largest percentage of health spending (43.8%), followed by curative services (33%). By category of expenditure, the largest budget item in the private sector was materials and supplies (30%, mainly for drugs), and in the public sector, it was personal services (22.7%). The following example is illustrative: 1% of the total health budget went to mental health, and of that amount, 91% was expenditure for the psychiatric hospital. Reported spending for the research and training component was 7.3%.

During the period 1999–2005, the gap between available financing and the amount needed to ensure drug coverage for 80% of the population was estimated at 66% (119). In 2001, public spending on drugs totaled US\$ 6 million (120); external cooperation contributed US\$ 6.8 million, and the private sector spent US\$ 60 million. Drugs accounted for three-fourths of total household spending on health. Access to essential drugs is limited for 45% of the population (especially vulnerable groups, such as hospitalized patients and some patients with chronic diseases) (121). A comparative study of prices for one product from the basic drugs list found that the cost in the private market was 4 to 10 times higher (122).

Health sector financing has risen since 1995. Per capita spending on health increased from US\$ 53.80 in 2001 to US\$ 59.40 in 2003. Health expenditure as a percentage of GDP rose from 2.4% in 1997 to 3.1% in 2004, and health spending as a percentage of total public expenditure went from 11.0% to 12.3%. Private sector spending climbed steadily, tripling between 1995 and 2001, which resulted in higher expenditure on the part of households. The latter constituted the main source of financing in 2003, accounting for nearly half of the total (46.8%). During the period 2001–2003, the specific per capita expenditure of households ranged from US\$ 27.70 to US\$ 29.10. The population continued to use out-of-pocket spending as a compensatory mechanism for obtaining needed services in a context of limited supply of services by the public sector and the gap between population growth and the response of the health sector to needs, especially with regard to supply of drugs and laboratory exams. The Ministry of Health is the second largest source of funding in the sector. Between 2001 and 2003, it accounted for one-third of total sector financing (32.1% in 2001, 34.8% in 2002, and 38.2% in 2003). This increase was associated with the allocation of the interim debt relief fund, fiscal funds, and external funds. Specific per capita spending by the Ministry of Health rose from US\$ 17.30 in 2001 to US\$ 22.70 in 2003 and US\$ 24.90 in 2004. The various levels of the INSS together constituted the third leading source of funding, contributing an average of 16% of total health financing during the period 2001–2003 (16.1% in 2001, 14.7% in 2002, and 15.1%

in 2003), although there has been a downward trend in the number of active INSS beneficiaries. Other sources accounted for 8.9% in 2001, 5.1% in 2002, and 8.2% in 2003. The in-kind contributions of community organizations are not reflected in health accounts, but the existence of 6,324 midwives, 12,748 community health workers, 6,926 health volunteers, 2,841 health promoters, and 339 community leaders is recognized. In terms of infrastructure, 4,369 basic health care centers and 30 maternity health care centers were reported (13).

Technical Cooperation and External Financing

An effort to coordinate, harmonize, and align external cooperation has been under way since the late 1990s with the aim of increasing its effectiveness and impact. Nicaragua is one of four developing nations among the partner countries of the Organization for Economic Cooperation and Development in which the Joint Country Learning Assessment (JCLA) initiative is being implemented with a view to enhancing the harmonization of aid. The Ministry of Health launched its organizational efforts to establish coordination mechanisms to ensure more efficient use of international cooperation resources in 1997, and in 1998 a legal instrument was adopted—Resolution 74-98, creating and implementing rules and procedures for the administration and channeling of such resources. In 1998, the Interagency Modernization Support Commission was formed to serve as a mechanism for consultation between the Ministry of Health and cooperation agencies. This was the starting point for the creation, in August 2001, of the Interagency Health Sector Support Commission as a forum for dialogue, consultation, and coordination between the Ministry of Health and cooperation partners. This process has made it possible to define a sector-wide approach for the health sector, with cooperation modalities such as direct budget support (a method for disbursing cooperation funds aimed at reducing costs and aligning aid with the national budget system and with the national priorities identified in the National Development Plan 2005–2009), creation of the National Health Fund (FONSALUD), and sectoral coordination tables.

The sector-wide approach aims to increase the efficiency of the health sector, reduce transaction costs, and increase the effectiveness of the health system. Key stakeholders in this process are the Ministry of Health, the Ministry of Finance and Public Credit, the Technical Secretariat of the Office of the President, and the Ministry of Foreign Affairs, together with development partners. The objective is to coordinate interventions in support of the five-year plan and harmonize national procedures for budget management, procurement, joint missions, and common indicators. The sector-wide approach also establishes a broad array of financing modalities, ranging from the common fund for budget support (FONSALUD) to specific projects.

During the period 1997–2004, the health sector received US\$ 324.6 million, or an average of US\$ 46.4 million per year. Al-

though the external cooperation contribution fluctuated, declining between 1995 and 2001 and then increasing in 2003 as a reflection of the poverty reduction strategy (19.2% in 1995, 7.7% in 2001, and 10.0% in 2003), it continued to be important for the development of the sector. In 2004, health cooperation totaled US\$ 51.3 million (US\$ 10 million less than in 2003) (123). That year, the country had 39 agreements and projects under way, 33% of them aimed at strengthening SILAIS, 26% for institutional development of the Ministry of Health, 24% for strengthening medical infrastructure and equipment, and 17% for health programs (124).

Nicaragua's multilateral cooperation partners include the World Bank, the Inter-American Development Bank (IDB), and various agencies of the United Nations system: PAHO/WHO, the United Nations Development Program, the International Atomic Energy Agency, the United Nations Population Fund (UNFPA), and the United Nations Children's Fund (UNICEF). In 2004, the IDB contributed 29.2% of all external financing and the World Bank, 5%, mainly for the health sector modernization program. The United Nations agencies together accounted for 22% of total cooperation (PAHO/WHO, 4.1%; UNFPA, 4.3%; and UNICEF, 12%). The principal bilateral agencies working in the health sector were those of Austria, Canada, Finland, Germany, Ireland, Italy, Japan, Luxembourg, the Netherlands, Spain, Sweden, the United Kingdom, and the United States. In 2004, the largest donors were Japan (6.9%, for rehabilitation and equipping of health centers), Sweden (5%, for strengthening of SILAIS), Luxembourg (4.5%), and the Netherlands (3.5%, for the sector-wide approach). Since 2005, a portion of international health cooperation has been received in the form of direct budget support allocated to FONSALUD. The Global Fund to Fight AIDS, Tuberculosis, and Malaria increased its contribution from 0.4% in 2003 to 8.2% in 2004, providing specific support for these three program areas. The Norwegian Development Fund contributed 4.1% towards modernization of the health sector. The contribution of the European Union in 2004 was 2.6%.

The nongovernmental sector is represented by numerous institutions sponsored by national and international donors that provide cooperation for specific projects. In 2003, the Ministry of Health received support from more than 30 international NGOs, among them Save the Children, CARE (Cooperative for Assistance and Relief Everywhere), Catholic Relief Services, the International Red Cross, Doctors of the World, and Doctors without Borders (125). A wide range of national NGOs exists, two of the most notable ones being the Federación Red Nica-Salud (NicaHealth Network Federation), an important partner for the implementation of initiatives supported by the Global Fund to Fight AIDS, Tuberculosis, and Malaria in the country, and PROFAMILIA, an organization dedicated to the promotion of reproductive health.

According to the most recent report of the Ministry of Foreign Affairs, in 2005 there were 220 international NGOs registered in the country, 70% of which had a signed framework agreement,

A Call to Protect the Health of Women, Children, and Adolescents

In 2003, maternal deaths among adolescent girls accounted for one-third of total maternal mortality. The main causes of morbidity among female adolescents were complications of pregnancy, childbirth, and the puerperium; domestic and sexual violence; injury; and poisoning. Adolescents aged 15–19 accounted for an estimated 32% of self-inflicted injuries (intentional self-harm).

One of the objectives of the National Health Plan is to increase the survival rate and the quality of life among women of childbearing age. Health programs are organized with a view to achieving this objective, with a priority focus on services for women, children, and adolescents (family planning, prenatal and postnatal care, growth and development monitoring, immunization, integrated management of childhood illness, and sexual and reproductive health). Most of these programs have been undertaken by the Ministry of Health with support from community organizations and NGOs.

16% were inactive, and 14% were active but without a framework agreement. The largest proportions of organizations were from the United States (30%), Spain (14%), and Italy (10%); the rest, in descending order by proportion, were from Germany, Switzerland, Canada, France, Finland, Norway, Denmark, Sweden, the United Kingdom, Belgium, Austria, and the Netherlands. The number of civil society organizations in Nicaragua is estimated at between 300 and 400 (126).

References

1. Nicaragua, Instituto Nicaragüense de Estudios Territoriales. Managua; 2006.
2. Nicaragua, Instituto Nacional de Estadísticas y Censos. VIII Censo de Población y IV de Vivienda, 2005. Cifras oficiales. Managua: INEC; 2006.
3. National Geographic; Tierras Nativas; Universidad de las Regiones Autónomas de la Costa Caribe Nicaragüense. Mapa de las regiones indígenas en Nicaragua. Managua; 2003. Actualización de la Asociación Pro Desarrollo Infantil y OPS/OMS; 2004.
4. Delgado R. La gobernabilidad democrática en Nicaragua: principales desafíos. Revista Probidad, edición 24; septiembre de 2003. Available at: <http://www.revistaprobidad.info/024/015.pdf>.
5. World Bank. Country assistance strategy for the Republic of Nicaragua. World Bank; 2002: 24–26. Available at: <http://wbln0018.worldbank.org/LAC>.
6. Fajardo R. El caso de Nicaragua. In: Las organizaciones sindicales centroamericanas como actores del sistema de relaciones laborales. Organización Internacional del Trabajo; 2003: 405–527. Available at: <http://www.ilo.org/public/english/dialogue/actrav/publ/orgsindca/nicaragua.pdf>.
7. Martínez M. Daños colaterales de huelga médica. El Nuevo Diario; 24 de mayo de 2006, Managua. Edición 9257. Available at: <http://www.elnuevodiario.com.ni/2006/05/24/nacionales/20175>.
8. EFECOM. Nicaragua casi paralizada por huelgas en los diferentes sectores. Agencia Efe; 6 de febrero de 2006, Managua. Available at: <http://www.finanzas.com/id.8970865/noticias/noticia.htm>.
9. Transparencia Internacional. Informe global de la corrupción 2004. Informes de países. Londres: TI; 2004: 291–294. Available at: http://www.transparency.org/publications/gcr/download_gcr/download_gcr_2004.
10. Nicaragua, Secretaría Técnica de la Presidencia. Informe política social y económica 2004. Managua; 2005.
11. Banco Central de Nicaragua. Informe anual 2005. Managua; 2006.
12. Instituto Nicaragüense de Turismo. Plan nacional de desarrollo turístico. Managua: Gobierno de Nicaragua; INTUR; 2005.
13. Nicaragua, Ministerio de Salud. Análisis de situación de salud. Propuesta plan nacional de salud. Managua: MINSA; 2003.
14. Regiones Autónomas del Atlántico Norte y Sur. Análisis de situación de salud, propuesta de plan de salud de las regiones autónomas de la costa atlántica de Nicaragua. Managua; julio 2004.
15. Nicaragua, Instituto Nacional de Estadísticas y Censos. Encuesta Nacional de Medición de Nivel de Vida, 2005. Unpublished.
16. Nicaragua, Sistema Nacional de Seguimiento a Indicadores de Desarrollo. [Labor statistics]. Managua: SINASID; 2004. Available at: <http://www.secep.gob.ni/sinasid/>.
17. Trejos JD. Características y evolución reciente del mercado de trabajo de Nicaragua. [Report prepared for the Interna-

- tional Labor Organization]. San José: Proyecto NIC Empleo; 2003.
18. Programa de las Naciones Unidas para el Desarrollo; Fondo de Desarrollo de las Naciones Unidas para la Mujer; Agencia Sueca de Desarrollo Internacional. Perfil de género en la economía del Istmo Centroamericana. UNIFEM; ASDI; 2006.
 19. United Nations Development Program. Human Development Report. UNDP; 2005.
 20. Gobierno de Nicaragua. Estrategia reforzada de crecimiento económico y reducción de pobreza. Managua; 2001.
 21. Gobierno de Nicaragua. Segundo informe de avance de la estrategia reforzada de crecimiento económico y reducción de pobreza; 2003.
 22. Nicaragua, Secretaría de Técnica de la Presidencia. Propuesta del plan nacional de desarrollo. Managua; 2004.
 23. Nicaragua, Secretaría Técnica de la Presidencia; Naciones Unidas. Primer informe de avance hacia los ODM, Nicaragua. SECEP; NNUU; 2003.
 24. Nicaragua, Ministerio de Salud. Evaluación de indicadores intermedios ERCERP. Managua: OPS; MINSA; 2003.
 25. Nicaragua, Secretaría Técnica de la Presidencia; Naciones Unidas. Primer foro nacional ODM Nicaragua. SECEP; NNUU; 2005.
 26. Gómez M. Los ODM y la cooperación externa en Nicaragua. [Intervention of Nicaraguan Vice Minister for External Cooperation at first national MDG-Nicaragua forum]; 2005.
 27. Nicaragua, Secretaría Técnica de la Presidencia; Naciones Unidas. Escenarios de inversión social para alcanzar los ODM. Managua: SECEP; NNUU; 2004.
 28. Gobierno de Nicaragua. Política nacional de seguridad alimentaria y nutricional. Managua; 2001.
 29. Nicaragua, Ministerio del Ambiente y los Recursos Naturales. Estado del ambiente en Nicaragua, 2003. II Informe GEO. Managua: MARENA; 2004.
 30. Programa de las Naciones Unidas para el Desarrollo. El desarrollo humano en Nicaragua. Equidad para superar la vulnerabilidad, 2000. Managua: PNUD; 2001.
 31. Nicaragua, Instituto Nacional de Estadísticas y Censos. Encuesta de Medición de Nivel de Vida, 1998. Managua: INEC; 1999.
 32. Programa de las Naciones Unidas para el Desarrollo. Informe de desarrollo humano 2005. Las regiones autónomas de la costa caribe: ¿Nicaragua asume su diversidad? PNUD; 2005.
 33. Nicaragua, Instituto Nicaragüense de Estadísticas y Censos. Estimaciones de población 1950–2050. Managua: INEC; 1999.
 34. Organización Internacional para las Migraciones, Sistema de Información Estadística sobre las Migraciones en Mesoamérica. Boletín: Movimientos internacionales en mesoamérica. Volumen 10. Nicaragua: un país de emigrantes. Encuesta de Hogares para la Medición del Empleo Urbano-Rural 2004. OIM/SIEMMES. Available at: www.siemmes.iom.int.
 35. Nicaragua, Ministerio de Salud, Dirección de Estadísticas y Sistemas de Información. [Statistics]. Managua: MINSA; 2006.
 36. Nicaragua, Ministerio de Salud. Indicadores básicos de salud, 2005. Managua: MINSA; 2005.
 37. Nicaragua, Instituto Nacional de Estadísticas y Censos. Encuesta Nicaragüense de Demografía y Salud (ENDESA) 2001. Managua: INEC; 2002.
 38. Nicaragua, Ministerio de Salud, Programa de Atención Integral a la Mujer, Niñez y Adolescencia.
 39. Nicaragua, Ministerio de Salud. Boletín epidemiológico. Semana N° 39, año 2004. Managua: MINSA; 2004.
 40. Organización Panamericana de la Salud, Organización Mundial de la Salud. Estudio de metanálisis de promoción de la salud sexual y reproductiva y prevención del VIH/SIDA en los adolescentes. OPS/OMS; 2005.
 41. Nicaragua, Instituto Nacional de Estadísticas y Censos. Encuesta Nicaragüense de Demografía y Salud (ENDESA) 1998; Encuesta Nicaragüense de Demografía y Salud (ENDESA) 2001; Encuesta sobre Salud Familiar 1992–1993.
 42. Nicaragua, Comisión Nacional de Promoción y Defensa de los Derechos del Niño y de la Niña.
 43. Nicaragua, Instituto Nacional de Estadísticas y Censos. Encuesta de Juventud (ENJOVEN) 2004. Managua: INEC.
 44. Centro de Investigación, Salud, Trabajo y Ambiente. Mercado laboral en León: sector informal y sus repercusiones en la salud. León: Universidad Nacional de Autónoma de Nicaragua; 2006.
 45. Nicaragua, Ministerio del Trabajo; Organización Internacional del Trabajo. Encuesta Nacional sobre Trabajo Infantil (ENTIA) 2000 y 2005. Managua: MINTRAB; 2000; 2005.
 46. Cerda A. Firman acuerdo binacional contra explotación sexual infantil. La Prensa; 20 de junio de 2006. Available at: <http://www-ni.laprensa.com.ni/archivo/2006/junio/20/noticias/nacionales/125232.shtml>.
 47. ECPAT International; Casa Alianza. Proyecto de fortalecimiento de la protección de niñas, niños y adolescentes ante la explotación sexual comercial en Centroamérica. Available at: http://www.ecpat.net/eng/ecpat_inter/projects/central_america_project/publications/panfleto%20nicaragua%20corregido1.doc.
 48. Organización Mundial contra la Tortura. Violencia contra la mujer en Nicaragua. Informe redactado para el Comité para la Eliminación de la Discriminación contra la Mujer. OMCT; 2001: 18.
 49. Nicaragua, Instituto Nacional de Estadísticas y Censos; Ministerio de Salud. Encuesta Nacional de Discapacidad (ENDIS) 2003. Managua: INEC; MINSA; 2004.
 50. Organización Panamericana de la Salud, Organización Mundial de la Salud. Análisis de la variable etnia en ENDESA y EMNV 2001. Managua: OPS; 2004.

51. Centro Centroamericano de Población. Migrantes nicaragüenses en Costa Rica: volumen, características y salud reproductiva. Universidad de Costa Rica; 2001.
52. Nicaragua, Ministerio de Salud, Dirección de Epidemiología Aplicada, Enfermedades de Transmisión Vectorial y Sistema de Vigilancia Epidemiológica Nacional.
53. Nicaragua, Ministerio de Salud. Informe del programa nacional de dengue. Managua: MINSa; 2006.
54. Sistema Nicaragüense de Vigilancia Epidemiológica Nacional. Enfermedades de Notificación Obligatoria (ENO), 2004.
55. Nicaragua, Ministerio de Salud. Informe del programa de leishmaniasis. Managua: MINSa; 2006.
56. Nicaragua, Ministerio de Salud. II Encuesta Serológica en Escolares, 2000. Managua: MINSa; OPS.
57. Nicaragua, Ministerio de Salud. Indicadores básicos de salud 2003 y 2005. Managua: MINSa; 2003 y 2005.
58. Nicaragua, Ministerio de Salud. Estudio de geohelmintosis en escolares rurales, 2005. MINSa; OPS; UNICEF.
59. Joint United Nations Program on HIV/AIDS. AIDS Epidemic Update. Geneva: UNAIDS; WHO; 2005: 63.
60. Nicaragua, Comisión Nicaragüense de SIDA. Plan estratégico nacional de ITS/VIH/SIDA, 2006–2010. CONISIDA; 2006.
61. Nicaragua, Ministerio de Salud. Programa Nacional de ITS/VIH/SIDA. Informe anual de vigilancia epidemiológica de ITS/VIH/SIDA, 2005. Managua: MINSa; 2006.
62. Joint United Nations Program on HIV/AIDS. [Estimates for Nicaragua]. UNAIDS; 2005.
63. United States of America, Johns Hopkins University. [Survey conducted by Center for Communication Programs/ Bloomberg School of Public Health]. 2001.
64. Nicaragua, Ministerio de Salud. Encuesta de Conocimientos, Actitudes y Prácticas: participación de hombres en programas de salud sexual y reproductiva. MINSa; Organización Panamericana de la Salud; Fondo de Población de las Naciones Unidas; Cooperación Técnica Alemana; 2004.
65. Nicaragua, Ministerio de Salud. Informe anual del programa de zoonosis. Managua: MINSa; 2005.
66. Nicaragua, Ministerio de Salud, Departamento de Zoonosis. Informe de leptospirosis comparativo 2000–2006. Managua: MINSa; 2006.
67. Nicaragua, Ministerio de Salud. Encuesta de Diabetes e Hipertensión y sus Factores de Riesgo, Iniciativa Centroamericana para la Diabetes (CAMDI) 2003. MINSa; OPS.
68. Nicaragua, Ministerio de Salud, Dirección de Estadísticas y Sistemas de Información. Estadísticas de mortalidad. Managua: MINSa; 2006.
69. Nicaragua, Ministerio de Salud; Organización Panamericana de Salud; Centros para el Control y la Prevención de Enfermedades. Resultados finales de la encuesta de diabetes e hipertensión y sus factores de riesgo, CAMDI, 2003. MINSa; OPS; CDC; 2005.
70. Nicaragua, Ministerio de Salud. Estadísticas de mortalidad. Managua: MINSa; 2005.
71. Nicaragua, Ministerio de Salud. Informe del Centro Nacional de Radioterapia. Managua: MINSa; 2006.
72. Nicaragua, Instituto Nacional de Estadísticas y Censos. Encuesta Nicaragüense de Demografía y Salud (ENDESA) 1998. Managua: INEC; 1999.
73. Nicaragua, Ministerio de Salud. Violencia y otras lesiones en cinco hospitales de Nicaragua. MINSa; CDC; OPS; 2004.
74. Nicaragua, Ministerio de Salud. Boletín epidemiológico. Semana N° 51, año 2001. MINSa; 2001.
75. Nicaragua, Ministerio de Salud. Boletín epidemiológico. Semana N° 48, año 2001. MINSa; 2001.
76. Organización Panamericana de la Salud, Organización Mundial de la Salud, Instrumento de Evaluación para Sistemas de Salud Mental. Informe sobre los sistemas de salud mental en Nicaragua, El Salvador y Guatemala. IESM/OMS; 2006: 11–28.
77. Pan American Health Organization. Multicentric study of gender, alcohol, culture, and harm. PAHO; 2005.
78. Nicaragua, Consejo Nacional de Lucha contra las Drogas. [Compilation from various information sources]; 2005.
79. Nicaragua, Ministerio de Salud. Boletín epidemiológico. Semana N° 52, año 2005. Managua: MINSa; diciembre 2005.
80. Nicaragua, Ministerio de Salud; Organización Panamericana de la Salud. Incidencia de intoxicaciones agudas por plaguicidas y estimación del subregistro en Nicaragua. Proyecto Plagasalud. Managua: OPS/OMS; DANIDA; 2002.
81. Miranda J, McConnell R, Wesseling C, Cuadra R, Delgado E, Torres E, et al. Muscular strength and vibration thresholds during two years after acute poisoning with organophosphate insecticides. *Occup Environ Med* 2004 Jan; 61(1):e4.
82. McConnell R, Keifer M, Rosenstock L. Elevated quantitative vibrotactile threshold among workers previously poisoned with methamidophos and other organophosphate pesticides. *Am J Ind Med* 1994 Mar; 25(3):325–34.
83. Rosenstock L, Keifer M, Daniell WE, McConnell R, Claypoole K. Chronic central nervous system effects of acute organophosphate pesticide intoxication. The Pesticide Health Effects Study Group. *Lancet* 1991 Jul 27; 338(8761):223–7.
84. McConnell R, Delgado-Tellez E, Cuadra R, Torres E, Keifer M, Almendarez J, et al. Organophosphate neuropathy due to methamidophos: biochemical and neurophysiological markers. *Arch Toxicol* 1999 Aug; 73(6):296–300.
85. Miranda J, Lundberg I, McConnell R, Delgado E, Cuadra R, Torres E, et al. Onset of grip- and pinch-strength impairment after acute poisonings with organophosphate insecticides. *Int J Occup Environ Health* 2002 Jan–Mar; 8(1):19–26.
86. Castro-Gutierrez N, McConnell R, Andersson K, Pacheco-Anton F, Hogstedt C. Respiratory symptoms, spirometry and chronic occupational paraquat exposure. *Scand J Work Environ Health* 1997 Dec; 23(6):421–7.

87. Nicaragua, Ministerio de Salud; Centro de Información, Vigilancia, Asesoramiento y Asistencia Toxicológica. Estudio de incidencia de intoxicaciones por plomo en niños. Managua: MINSa; CIVATOX; 2004.
88. Organización Panamericana de la Salud, Organización Mundial de la Salud; Fondo de la Infancia de las Naciones Unidas Evaluación rápida de la calidad del agua de bebida. OPS/OMS; UNICEF; Managua; 2005.
89. Organización Panamericana de la Salud, Organización Mundial de la Salud. Salud oral. Available at: <http://www.paho.org/Spanish/GOV/CD/doc259.pdf>. [Document CD40/20 presented to PAHO 40th Directing Council in September 1997].
90. Nicaragua, Ministerio de Salud. Estudio epidemiológico de salud bucal en niños de 6, 7, 8, 12 y 15 años de escuelas y colegios públicos de Nicaragua. Managua: MINSa; 1999.
91. Organización Panamericana de la Salud, Organización Mundial de la Salud. Informe final. Project 15. Interprogrammatic Oral Health Activity, Health Canada. Modelos de atención para mejorar la salud bucal de las poblaciones indígenas y vulnerables en la frontera entre Honduras y Nicaragua.
92. Organización Internacional del Trabajo. Perfil nacional sobre salud y seguridad en el trabajo en Nicaragua. OIT; 2004.
93. Nicaragua, Ministerio del Trabajo. Estadísticas de accidentabilidad laboral 2000–2005. Managua; 2006.
94. Instituto Nicaragüense de Seguridad Social. Anuario estadístico. INSS; 2004.
95. Nicaragua, Ministerio de Salud. Política Nacional de Salud, 2004–2015. MINSa; 2004.
96. Sanigest Internacional. Evaluación de las políticas nacionales de salud durante el periodo 1997–2002. Managua: SANIGEST; 2004.
97. Nicaragua, Ministerio de Salud; Organización Panamericana de la Salud. Medición del desempeño de las funciones esenciales de salud pública ejercidas por la autoridad sanitaria de Nicaragua. Resultados del taller de aplicación del instrumento. Managua: MINSa; OPS; 2001.
98. Nicaragua, Ministerio de Salud; Organización Panamericana de la Salud. Informe final medición del desempeño de las funciones esenciales de la salud pública en el SILAIS. Managua; 2006.
99. Organización Panamericana de la Salud, Organización Mundial de la Salud. Proyecto inequidad en salud, etnicidad, Nicaragua. Managua: OPS/OMS; 2004.
100. Nicaragua, Instituto Nacional de Estadísticas y Censos. Encuesta de Medición de Nivel de Vida (EMNV) 2001.
101. Nicaragua, Ministerio de Salud. Marco conceptual del Modelo de Atención Integral en Salud (MAIS). Managua: MINSa; 2005.
102. Nicaragua, Ministerio de Salud. Encuesta de establecimientos de Nicaragua. Managua: MINSa; 2002.
103. Instituto Nicaragüense de Seguridad Social. Memoria institucional 2004. Managua: INSS; 2005.
104. Nicaragua, Ministerio de Salud; Empresa Nicaragüense de Acueductos y Alcantarillados; Instituto Nicaragüense de Acueductos y Alcantarillados; Organización Panamericana de la Salud; Agencia Suiza para el Desarrollo y Cooperación; Banco Interamericano de Desarrollo; Banco Mundial; Fondo de las Naciones Unidas para la Infancia. Análisis sectorial de agua potable y saneamiento en Nicaragua. Managua; 2004.
105. Empresa Nicaragüense de Acueductos y Alcantarillados. Informe 2004. Managua: ENACAL; 2004.
106. Organización Panamericana de la Salud, Centro Panamericano de Ingeniería Sanitaria y Ciencias del Ambiente. Evaluación regional de los servicios de manejo de los residuos sólidos municipales. Informe analítico de Nicaragua. OPS; CEPIS; 2003.
107. Instituto Nicaragüense de Fomento Municipal, Sistema de Información de Servicios Municipales. Managua: SISEM/INIFOM; 2006.
108. Nicaragua, Ministerio del Ambiente y los Recursos Naturales. Estado del ambiente en Nicaragua 2003. II Informe Geo. Managua: MARENA; 2004.
109. Nicaragua. Ley 217: Ley General del Medio Ambiente y los Recursos Naturales. Managua; 1997.
110. Nicaragua, Ministerio del Ambiente. Indicadores ambientales de Nicaragua. Volumen I. Managua; 2004.
111. Nicaragua. Ley 337: Ley creadora del Sistema Nacional para la Prevención, Mitigación y Atención de Desastres. Managua; 2000.
112. Nicaragua. Decreto 98-2000. Reglamento de la Ley 337: Ley Creadora del Sistema Nacional para la Prevención, Mitigación y Atención de Desastres. Managua; 2000.
113. Nicaragua. Decreto 98-2000. Reglamento de asignación de funciones del Sistema Nacional para la Prevención, Mitigación y Atención de Desastres a las Instituciones del Estado. Managua; 2000.
114. Nicaragua. Decreto 118-2001. Reformas e incorporaciones al Reglamento de la Ley 290: Ley de Organización, Competencia y Procedimientos del Poder Ejecutivo. Managua; 2002.
115. Nicaragua, Ministerio de Salud. Guía para la elaboración de planes de emergencias hospitalarios para situaciones de desastres. Primera edición. Managua: MINSa; OPS/OMS; 2005.
116. Nicaragua, Ministerio de Salud. Guía metodológica para la elaboración del plan de emergencia sanitaria local. Segunda edición. Managua: MINSa; OPS/OMS; 2002.
117. Nicaragua, Ministerio de Salud. Informe del programa de salud oral. Managua: MINSa; 2006.

118. Nicaragua, Ministerio de Salud, Dirección de Recursos Humanos. Cálculos del Centro de Inteligencia Sanitaria/Organización Panamericana de Salud. MINSA; 2006.
119. Nicaragua, Ministerio de Salud, Dirección de Insumos Médicos; 2005.
120. Nicaragua, Ministerio de Salud, Dirección de Insumos Médicos; 2000.
121. Nicaragua, Ministerio de Salud. Cuentas Nacionales en Salud 2002. Managua: MINSA; 2003.
122. Nicaragua, Comisión Nacional de Medicamentos. Comparación de precios.
123. Nicaragua, Ministerio de Salud. Cuentas Nacionales en Salud; 2005.
124. Nicaragua, Ministerio de Salud. Informe de cooperación externa de MINSA en 2005. Managua; 2006.
125. Nicaragua, Ministerio de Salud. Informe de cooperación externa de MINSA en 2004. Managua; 2005.
126. Braunschweig T, Stöckli B. La perspectiva de la sociedad civil respecto a su participación en el seguimiento de ERP: evaluación de limitaciones y potenciales en Nicaragua. Berna (Suiza): Alliance Sud; 2006.