INTRODUCTION

Brazil, one of the five largest countries in the world, has over 190 million inhabitants and a land area of more than 8,500,000 km² (1). The country is divided politically into 26 states and the Federal District, and into five regions (North, Northeast, Southeast, South, and Center-West), which have significant economic, cultural, and demographic differences among them.

The country is undergoing a process of reduction in fertility and early mortality rates and an increase in life expectancy at birth. As of 2010, the estimated population was 190,755,799, 84% of whom lived in urban areas (Figure 1). Life expectancy at birth was 66.3 years in 1990 and 73.17 in 2009 (77.0 years for women and 69.4 years for men). The fertility rate declined from 2.38 children per woman in 2000 to roughly 1.86 children per woman in 2010, which is below the population
replacement rate. Brazilians aged 65 and over accounted for 4.9% of the total population in 1995, 6.1% in 2005, and 7.4% in 2010.

HEALTH DETERMINANTS AND INEQUALITIES

The last decade saw the beginning of a period of economic growth in Brazil, linked to improvements in income distribution and to unprecedented reductions in social inequalities and extreme poverty (2, 3, 4).

Between 2003 and 2010, 10 million jobs were created in the formal sector. Between the 2000 and 2010 censuses, illiteracy declined from 13.6% to 9.6% (1). In turn, income transfer programs geared to families—Programa Bolsa Família (Family Grant Program), Benefício da Prestação Continuada (Continued Payment Benefits), and Previdência Rural (Rural Social Welfare)—contributed to the fact that economic growth was accompanied by an improvement in the living conditions of the poorest sectors of the population (2).

The Programa Bolsa Família (PBF) has its roots in the 1995–2003 Conditional Cash Transfer programs, the first experience with income transfers to families in Latin America (5, 6). The PBF seeks to invest in human capital, associating cash transfers to educational goals and utilization of health services. It is present in 5,564 municipalities across the 27 states of Brazil. In 2007, US$ 3.7 billion was invested for the benefit of nearly 12.9 million families (approximately 52 million people, or 25% of the Brazilian population) (5). Some studies have examined the effects of the PBF on poverty and inequity, food expenditure, education, health services utilization, food security, and nutritional status. The Gini coefficient, an indicator of income distribution, had remained stable in Brazil since the early 1980s, fluctuating around 0.60, making Brazil one of the most unequal countries in the world. Since 2001, this indicator has systematically declined, to 0.543 in 2009; almost one-quarter of this decline can be attributed to the PBF (7). Anthropometric data from a sample of 22,375 program beneficiaries under 5 years of age show that these children were 26% more likely to achieve standard height-for-age and weight-for-age than were nonbeneficiaries. The PBF is meant to prevent families from encouraging the entry of children aged 14 or under into the job market, to motivate families so that the children complete their secondary education, and to promote utilization of the health services, particularly by pregnant women and children under 7 years old.

Between 1990 and 2010, the population increased 30.7%. In 1990, the population structure showed a pyramidal shape, although with some narrowing in the age group under 5 years old, which reflects a significant decrease in fertility. In 2010, the age groups younger than 25 years show similar trends or even reductions. This reflects a gradual decrease in fertility and low mortality. The percentage of those older than 59 years increased in the intervening years.


* Each age group’s percentage represents its proportion of the total for each sex.
THE ENVIRONMENT AND HUMAN SECURITY

ACCESS TO CLEAN WATER AND SANITATION

In 2008, all municipalities in the country were connected to the water supply system, and 55.2% were served by the sewerage system (8). Also in 2008, 92.8% of the urban population had access to an adequate source of drinking water, while only 31.5% of the rural population had access to an adequate source of drinking water and only 24.2% had access to the general sewerage system or to septic tanks (8). A significant proportion (32%) of sewage receives no treatment and is released directly into freshwater sources.

SOLID WASTE

In 2008, nearly 90% of urban households had waste collection services, whereas in rural areas, 70% did not have access to these services (8). The widest coverage was found in the Southeast region (88.5%), and the least coverage, in the Northeast (63.5%). In 51% of Brazilian municipalities, solid waste was disposed of in irregular open-air dumps, whereas 27.7% of municipalities, mainly in the South and Southeast regions, had a sanitary landfill (9).

DEFORESTATION AND SOIL DEGRADATION

Over the last three decades, the Brazilian Amazon region has experienced significant changes in land use patterns due to an intense process of human occupation, along with national and international economic pressures. It is estimated that, during this period, the Amazon region has lost 17% of its native forests, mainly through processes of deforestation, slash-and-burn clearing, and expansion of livestock (10).

AIR POLLUTION

In 2002, 1,224 municipalities (22% of the total) reported the frequent presence of high air pollution rates. The leading causes of pollution were forest fires, industrial activities, and heavy vehicular traffic (11). Between 2003 and 2007, respiratory diseases were the second leading cause of hospitalization and the fifth leading cause of death in the country (12). A recent review of scientific articles on the relationship between air pollution and health impairments found that 27 of the included studies (93%) indicated adverse effects due to this risk factor, even at levels below legally permitted emissions standards (13).

PERSISTENT ORGANIC POLLUTANTS

Brazil ratified the Stockholm Convention on Persistent Organic Pollutants in 2004. The Ministry of the Environment, Brazil’s technical focal point for the Convention, has prepared an inventory on the unintentional emission of persistent organic pollutants. Overall, 5,292 areas known to be contaminated or under suspicion of pollution by chemical substances have been recorded throughout Brazil; of these, 281 are contaminated by persistent organic pollutants (14).

PESTICIDES

Brazil is the world’s leading consumer of pesticides. In 2009, the sale of pesticides accounted for a US$ 6.6-billion market in Brazil, with more than 335,816 tons of active ingredients and 725,000 tons of finished products sold (15). Acute pesticide poisoning is the second leading cause of exogenous toxicity, and 137,089 cases of pesticide poisoning were reported between 1999 and 2008 (16).

DISASTERS

Between 2003 and 2009, 9,583 states of emergency or disaster were declared; of these, 64.1% were due to drought or low-water levels, and 30.2%, to floods (17). Landslides are increasingly frequent and severe. Among the areas most affected by landslides have
been the state of Santa Catarina in 2008, the Northeast region of Brazil in 2010, and the mountainous section of the state of Rio de Janeiro in 2011 (17). It has been confirmed that more than 90% of landslides in the Highland region of Rio de Janeiro were associated with some type of human intervention, such as construction of roads, trails, and embankments; deforestation; and degradation of areas of native vegetation and grassland by erosion, which has contributed to a destabilization of slopes (18).

**Climate Change**

In recent years, the number of extreme weather events is believed to have increased substantially in Latin America in general and in Brazil in particular (19). Climate fluctuations affect the dynamics of vector-borne diseases, with an increased incidence of dengue fever in the summer and of malaria during the dry season. These phenomena also affect water-borne diseases, such as leptospirosis, viral hepatitis, and diarrheal diseases. Furthermore, respiratory diseases are exacerbated by slash-and-burn practices such as those carried out in the Amazon region and by the effect of thermal inversions, which concentrate pollution and consequently decrease air quality in major urban centers, such as São Paulo (20).

According to Ministry of Health reports, Brazil has already seen a change in the patterns of extreme meteorological phenomena. These events, especially precipitation-related ones, have varied in presentation and intensity. More episodes of torrential rainfall are being recorded, particularly in large urban centers, leading to disasters with significant death tolls, changes in morbidity patterns, and major economic losses (21).

**Food and Nutritional Security**

The area of Brazil recognized as free of foot-and-mouth disease has been expanded over time. In 1998, two states (Rio Grande do Sul and Santa Catarina) and the Federal District made up the disease-free areas where vaccination was provided. By 2005, there were 13 states and the Federal District in that category. However, later in 2005, reintroduction of the foot-and-mouth disease virus into two states led to the suspension of the recognition of the disease-free area in 11 states and the Federal District, but with recognition restored again in 2008. Since 2008, the disease-free area has been expanded to include the state of Acre and parts of the states of Pará and Amazonas. Santa Catarina is considered a foot-and-mouth disease-free area without vaccination. Although bovine spongiform encephalopathy (BSE) and avian influenza are exotic to Brazil, they pose a substantial human and animal health hazard and a great hazard to food production. Therefore, the country maintains an active surveillance system in which government agencies, rural producers, and private enterprise take part, and which includes contingency plans to manage critical situations. Neither indigenous nor imported cases of these diseases (22) have ever been reported.

**Health Conditions and Trends**

**Health Problems of Specific Population Groups**

**Maternal and Reproductive Health**

In Brazil, births attended by skilled health staff are practically universal (99%), and the percentage of contraceptive use is quite high (81% among women aged 15–49 years old in 2009) (12, 23). Between 1990 and 2007, a decline occurred in all leading causes of maternal death, including hypertension (62.8% reduction), hemorrhage (58.4% reduction), puerperal infections (46.8% reduction), abortion (79.5% reduction), and circulatory diseases complicating pregnancy, childbirth, and the puerperium (50.7% reduction) (7). On the other hand, forecasts through 2015 indicate challenges to achieving the Millennium Development Goal 5 for reducing maternal mortality rate (7). For the 2008–2015 period, the projected maternal mortality rate is 69 to 77 deaths per 100,000 live births. The persistence of
high rates of cesarean delivery, throughout the country (44%) and particularly in highly developed regions, is still a cause for concern (24).

**Children (under 5 years old)**

Mortality among those under 5 years of age declined from 24.8 per 1,000 live births in 2006 to 22.4 in 2009; consequently, Brazil is expected to reach Millennium Development Goal 4 before 2015 (7, 23). Infant mortality has followed a similar downward trend, from 20.7 per 1,000 live births in 2006 to 17.1 in 2009 (Figure 2). In recent years, the greatest reductions were seen in postneonatal mortality, whereas early neonatal mortality declined the least; perinatal disorders were the leading causes of infant mortality (4, 20). Differences among regions and population groups are significant. The nonwhite (indigenous and black) population has a markedly excessive mortality rate, as do those living in the Northeast region of the country.

**Adolescents (13–15 years old)**

The health of school-age children is monitored by means of surveys conducted in all the Brazilian state capitals. In 2009, 63,411 students aged 13 to 15, from 1,453 public and private schools, were interviewed (25). Of these, 76% had never smoked, 76% of those who were sexually active had used a condom during their most recent intercourse, 87.5% were well-informed on prevention of AIDS and other sexually transmitted infections, and over 80% had received information in the classroom on how to prevent pregnancy. On the other hand, 27% of these students had consumed alcohol at least once during the preceding 30 days, and over 30% were sedentary or insufficiently active.

**Men**

In 2008, 57.4% of all deaths occurred among men, and excess mortality in this population group was recorded in all regions of Brazil (23, 26). The leading causes of death among men were ischemic heart diseases (including acute myocardial infarction, with 55,162 deaths), cerebrovascular diseases (49,311 deaths), and homicide (44,671 deaths). While male life expectancy increased from 63.2 years in 1991 to 69.7 years in 2010, it was still 7.6 years below the 2010 average life expectancy of women, 77.3 years (27). In 2010, prostate cancer was the second most frequent malignancy (52,350 new cases), surpassed only by non-melanoma skin cancer (53,410 new cases) (28).
Workers

The establishment of the National Workers’ Health Policy in Brazil includes the creation of specific referral centers and of the National Network for Worker Health Care (29). In 2011, a list of compulsory notification events was compiled from sentinel unit data. The most commonly reported events were serious occupational injury (106,084 cases), exposure to biological material (80,809), repetitive strain injury (12,732), pneumoconiosis (1,091), occupational skin diseases (1,048), poisoning (8,656), hearing loss due to occupational noise (742), mental disorders (737), and occupational cancer (59) (12).

Ethnic or Racial Groups

The indigenous population of Brazil has grown in recent decades, and is now estimated at nearly 770,000 people. Among the indigenous population, 51% is male, and 65% is under 25 years old. The infant mortality rate in the indigenous population has declined substantially (43.8%) in recent years, from 74.6 per 1,000 live births in 2000 to 41.9 per 1,000 in 2009. Despite this reduction, the mortality rate in this group remains more than double the national average, which in 2009 was 17.1 deaths per 1,000 live births.

The black population of Brazil is particularly vulnerable to several health risks, due to low social mobility across generations. For example, homicide-related mortality rates in 2010 were 15.4, 28.0, and 37.6 deaths per 100,000 among white, black, and brown persons, respectively (12). There are also differences among the various ethnic or racial groups in terms of access to health care. For example, in 2010 among pregnant women, 75.2% of white, 53.8% of black, 48.3% of brown, and 18.9% of indigenous women had more than six prenatal visits (12, 23).

Mortality

In 2010, the crude death rate in Brazil was 6.0 deaths per 1,000 population (12). The leading causes of mortality were ischemic heart disease (52.4 deaths per 100,000 population), cerebrovascular disease (52.3), and malignant neoplasms of the digestive organs (31.1) (12) (Table 1).

<table>
<thead>
<tr>
<th>Cause</th>
<th>Total No.</th>
<th>%</th>
<th>Rate</th>
<th>Men No.</th>
<th>%</th>
<th>Rate</th>
<th>Women No.</th>
<th>%</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ischemic heart disease</td>
<td>99,955</td>
<td>8.8</td>
<td>52.4</td>
<td>58,230</td>
<td>9.0</td>
<td>62.3</td>
<td>41,719</td>
<td>8.6</td>
<td>42.9</td>
</tr>
<tr>
<td>Cerebrovascular diseases</td>
<td>99,732</td>
<td>8.8</td>
<td>52.3</td>
<td>50,536</td>
<td>7.8</td>
<td>54.1</td>
<td>49,190</td>
<td>10.1</td>
<td>50.5</td>
</tr>
<tr>
<td>Malignant neoplasms of the digestive organs</td>
<td>59,295</td>
<td>5.2</td>
<td>31.1</td>
<td>32,043</td>
<td>4.9</td>
<td>34.3</td>
<td>24,250</td>
<td>5.0</td>
<td>24.9</td>
</tr>
<tr>
<td>Other heart disease</td>
<td>58,085</td>
<td>5.1</td>
<td>30.4</td>
<td>29,778</td>
<td>4.6</td>
<td>31.9</td>
<td>28,307</td>
<td>5.8</td>
<td>29.1</td>
</tr>
<tr>
<td>Influenza and pneumonia</td>
<td>55,338</td>
<td>4.9</td>
<td>29.0</td>
<td>27,573</td>
<td>4.2</td>
<td>29.5</td>
<td>27,760</td>
<td>5.7</td>
<td>28.5</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>54,877</td>
<td>4.8</td>
<td>28.8</td>
<td>24,002</td>
<td>3.7</td>
<td>25.7</td>
<td>30,872</td>
<td>6.3</td>
<td>31.7</td>
</tr>
<tr>
<td>Injury</td>
<td>52,260</td>
<td>4.6</td>
<td>27.4</td>
<td>47,749</td>
<td>7.4</td>
<td>51.1</td>
<td>4,465</td>
<td>0.9</td>
<td>4.6</td>
</tr>
<tr>
<td>Hypertension</td>
<td>45,056</td>
<td>4.0</td>
<td>23.6</td>
<td>21,190</td>
<td>3.3</td>
<td>22.7</td>
<td>23,862</td>
<td>4.9</td>
<td>24.5</td>
</tr>
<tr>
<td>Road traffic accidents</td>
<td>43,908</td>
<td>3.9</td>
<td>23.0</td>
<td>35,836</td>
<td>5.5</td>
<td>38.4</td>
<td>8,058</td>
<td>1.7</td>
<td>8.3</td>
</tr>
<tr>
<td>Lower respiratory tract infections</td>
<td>40,608</td>
<td>3.6</td>
<td>21.3</td>
<td>23,432</td>
<td>3.6</td>
<td>25.1</td>
<td>17,174</td>
<td>3.5</td>
<td>17.6</td>
</tr>
<tr>
<td>All causes</td>
<td>1,136,947</td>
<td>100.0</td>
<td>596.0</td>
<td>649,378</td>
<td>100.0</td>
<td>695.2</td>
<td>487,137</td>
<td>100.0</td>
<td>500.4</td>
</tr>
<tr>
<td>Ill-defined causes</td>
<td>62,809</td>
<td>5.5</td>
<td>32.9</td>
<td>37,255</td>
<td>5.7</td>
<td>39.9</td>
<td>25,500</td>
<td>5.2</td>
<td>26.2</td>
</tr>
</tbody>
</table>

Source: (12).
With regard to proportional mortality by broad cause groups, cardiovascular diseases (26.4%), external causes (18.2%), and neoplasms (14.8%) were, in that order, the leading causes of death in the male population. Those three causes were responsible for 59% of all deaths among men in 2010. Among women, cardiovascular diseases (31.8%), neoplasms (17.0%), and diseases of the respiratory system (11.5%) were the leading causes of death, accounting for 60% of all female deaths in 2010 (12, 30). More than 140,000 deaths were due to external causes in 2010, and specific proportional mortality due to these causes was 5.1% for women and 18.2% for men. In that same year, nearly 81% and 66% of all deaths in men aged 5–24 and 25–34 years, respectively, were attributed to external causes.

During the last decade, major changes in mortality patterns were observed. Between 1996 and 2010, the proportion of deaths due to infectious and parasitic diseases decreased from 5.8% to 4.3% (12). Furthermore, the proportion of deaths due to ill-defined causes decreased from 15.1% in 1996 to 7.9% in 2010, which reflects improvements in Brazil’s mortality information systems. Along with these advances in health and with the population’s aging, between 1996 and 2010 there was an increase in the proportion of deaths due to neoplasms (from 11.4% to 15.7%); endocrine, nutritional, and metabolic diseases (from 0.4% to 6.2%); and circulatory diseases (from 27.5% to 28.7%).

**Morbidity**

**Communicable Diseases**

**Vector-borne Diseases**

Dengue’s mosquito vector is found in all the states of Brazil, and all four serotypes of the dengue virus are currently in circulation. The dengue virus was reintroduced into Brazil in 1981 and 1982, with the first documented epidemic occurring in the city of Boa Vista (state of Roraima). That epidemic was due to serotypes 1 and 4. In 2002, there were 794,219 cases of dengue, and in 2008, there were 806,036. Since 2000, the number of severe cases has increased, with a case-fatality rate among them of 10% in 2006 and 2007 (12). In 2010, the worst year with regard to transmission of the disease, there were 1,011,647 new cases, 17,489 serious cases, and 656 deaths reported. Preliminary results for 2011 reveal an important decline in the number of new cases, severe cases, and deaths due to dengue, as compared to 2010.

Most of the malaria cases occur in the Brazilian Amazon region. The average annual number of confirmed cases in the last 10 years was 530,000, distributed across 807 municipalities in nine states. In 2010, a total of 332,329 cases were recorded, an increase of more than 8% as compared to the 308,306 cases in 2009. The predominant causative agent was *Plasmodium vivax*, which accounted for approximately 86% of all confirmed cases. In 2009, 83 malaria-related deaths were reported (12). The high endemicity of malaria in the Amazon region is mainly associated with changes in extractive economic activities, which produce internal migrations and transient rural settlements.

No cases of urban yellow fever have been recorded since 1942. However, the yellow fever virus transmission cycle persists in the wild, leading to isolated cases and sporadic outbreaks. The latter occur most frequently in men over 15 years of age—usually farmers, loggers, fishermen, and ecotourists—and mainly between January and April. From 1990 to 2010, 587 cases and 259 deaths due to yellow fever were reported (12). Until 2000, areas of endemic circulation of the yellow fever virus included the North and Center-West regions, part of the state of Maranhão, and the western region of the state of Minas Gerais. From 2000 onward, a progressive expansion of viral circulation toward the Southeast and South regions was observed, due particularly to the proximity between urban and wild environments, high rates of infestation and dispersion of the yellow fever vector, and exposure of persons to jungle areas where the virus circulates.

In 2006, Brazil received international certification of the interruption of transmission of Chagas’ disease by *Triatoma infestans*. It is estimated that the prevalence of the disease by vector-borne
transmission is 0.01%, a percentage lower than that observed in a survey conducted between 1975 and 1980, when the prevalence rate was 4.2%. However, recent years have seen outbreaks of acute Chagas' disease due to the intake of contaminated food (sugarcane juice, açai, and bacaba, among others) and isolated cases of extradomestic vector-borne transmission, especially in the Brazilian Amazon region. Between 2000 and 2010, 1,007 cases of acute Chagas' disease were reported, of which 73% (736 cases) were due to oral transmission and 1.8% (18) to vector-borne transmission, whereas 25% (252) of cases had no specified form of transmission (12).

Visceral leishmaniasis, or kala-azar, is present in 21 states across all five regions of Brazil, mainly in the periphery of large urban centers. Epidemics were recorded in the 1980s and 1990s. In 1999 and 2000, nearly 4,000 cases were reported each year. Between 2001 and 2010, 33,633 cases and 2,279 deaths occurred. The most affected group comprises male children under the age of 10 living in the Northeast region of Brazil. Between 1988 and 2009, there were an average of 26,021 cases of American cutaneous leishmaniasis reported per year, with a detection rate of 14.1 cases per 100,000 population. The detection rate has been trending upward, and in 2003, the indigenous form of the disease was present in all the states of Brazil. The North region accounts for the largest number of cases and the highest rate of infection (66.9 cases per 100,000 population). In 2010, 22,397 cases of American cutaneous leishmaniasis were reported in the country (31).

Vaccine-preventable Diseases

During the last decade, successful control of vaccine-preventable diseases played a substantial role in the reduction of infant mortality rates (32). The National Immunization Program provides, free of charge, vaccines against tuberculosis (BCG); poliomyelitis; measles, mumps, and rubella (MMR); diphtheria, pertussis, tetanus, and Haemophilus influenzae type b infection (DPT-Hib); and hepatitis B. Annual immunization campaigns against seasonal influenza have traditionally focused on the over-60 population and on indigenous groups. In 2010, the target population for these annual vaccination campaigns was expanded to include young children, pregnant women, and health care providers. In 2006, the oral rotavirus vaccine was introduced to the routine child immunization schedule, which has led to a significant reduction in diarrhea-related deaths and hospitalizations throughout the country (33). In 2008, more than 70 million adults and adolescents were vaccinated against measles and rubella in order to contribute to the elimination of rubella and congenital rubella syndrome. The last case of endemic rubella in Brazil occurred in December 2008, and the last case of congenital rubella syndrome was in a child born in August 2009. The country is in the process of receiving certification of the elimination of measles, rubella, and congenital rubella syndrome. Coverage with the oral polio vaccine has remained high, and two national days of immunization against poliomyelitis are held every year so as to keep the country free from circulation of wild-type poliovirus. In response to the emergence of the influenza A(H1N1) pandemic, over 80 million people in high-risk groups were vaccinated in 2010. Also in 2010, two new vaccines were introduced to the basic child immunization schedule: a new 10-valent pneumococcal conjugate vaccine and the meningococcal vaccine.

Zoonoses

The main zoonoses present in Brazil are yellow fever, hantavirus, rabies, Chagas’ disease, visceral leishmaniasis, American cutaneous leishmaniasis, leptospirosis, Rocky Mountain spotted fever, and the accidental bite or sting of a poisonous animal (12). Between March 2006 and February 2010, when 673 events of public health importance were recorded, zoonoses and vector-borne diseases were the most common, accounting for 40% of reports (12).

Neglected Diseases and Other Infections Related to Poverty

In recent years, the prevalence of leprosy has declined progressively, from 2.37 per 10,000 population in 2006 to 1.56 per 10,000 population in 2010. So has the number of new cases detected, from 44,436 in 2006 to 34,894 in 2010 (an average
reduction of 1.3 cases per 100,000 population per year). However, Brazil remains the only country of the Americas that has not reached the goal—crucial to elimination of leprosy as a public health concern—of less than 1 reported case per 10,000 population. In 2010, 7.1% (2,461) of new cases were reported in children, with a detection rate of 5.5 per 100,000 children under 15 years old; 7.2% of new patients had Grade 2 disability.

Little information is available on the frequency of lymphatic filariasis in the country as a whole. Over the last five decades, efforts aimed at reducing this disease focused on eliminating human sources of infection. Currently, transmission of lymphatic filariasis is restricted to the endemic areas of four municipalities (Recife, Olinda, Jaboatão dos Guararapes, and Paulista) that are in the Recife metropolitan area, where the prevalence of microfilaremia ranges between 2% and 15% (31).

Schistosomiasis presents a broad geographical distribution, with more widespread transmission in the Northeast region. In 2010, there were 41,167 cases reported, 27,110 of which were in the Northeast. Over the last two decades, there was a substantial decline in schistosomiasis-related hospitalization rates (90% between 1990 and 2009) as well as in mortality rates (50% between 1990 and 2008). In addition, over a 10-year period, there was a 60% reduction in the number of municipalities with a prevalence rate above 25%, according to stool parasite testing, although the prevalence remained high in many rural areas (31).

HIV/AIDS and Other Sexually-transmitted Infections

The first cases of AIDS in Brazil were identified in the early 1980s. Three decades on, it is estimated that 630,000 people between the ages of 15 and 49 are living with HIV/AIDS in the country. The population-wide prevalence rate of HIV infection in this age group has remained stable at 0.6% since 2004—0.4% in women and 0.8% in men (34).

In studies conducted in 10 municipalities between 2008 and 2009, higher estimated HIV prevalence rates occurred among users of illegal drugs (5.9%) (35), men who have sex with men (10.5%) (36), and female sex workers (4.9%).

Between 1980 and June 2011, 608,230 cases of AIDS were diagnosed in Brazil. In 2010, there were 34,212 new cases and 11,965 deaths recorded, with the highest percentage of cases found in the Southeast region (58.0%). The proportion of AIDS cases has declined noticeably among injectable drug users of both sexes. In addition, the incidence of AIDS in those under 5 years of age (49.2%) has gone down, and so has the rate of vertical transmission of HIV (35).

Mortality per 100,000 population dropped from 9.6 in 1996 to 6.3 in 2010. Diagnostic coverage was expanded from 23.9% in 1998 to 38.4% in 2008 by means of the Fique Sabendo (“Find Out”) initiative, and prophylactic treatment coverage to reduce vertical transmission during delivery rose from 46.6% in 2003 to 50% in 2009 (37).

Tuberculosis

As far as incidence rate is concerned, Brazil holds the 22nd place among the 22 countries with the highest TB burden assigned priority status by WHO in 2011. In 2010, 71,000 new cases were reported, and the incidence rate was 37.2 cases per 100,000 population—30% less than in 1990. Although the overall incidence rate is considered low, higher rates persist in some states, such as Rio de Janeiro (69.7 cases per 100,000 population) and Amazonas (65.7). In 2009, 4,800 deaths from tuberculosis were reported. TB was the leading cause of death among people with AIDS and the third leading cause of death among all infectious diseases (12). Multidrug-resistant tuberculosis is not a major problem. As of 2009, the cure rate for new smear-positive cases of pulmonary tuberculosis was 72.5%, and the treatment dropout rate was 9.5%.

Emerging Diseases

In 1991, Brazil experienced its seventh cholera pandemic. Beginning in 1993, the number of cases declined steadily, and in 2001 only seven cases were confirmed. Between 2002 and 2008, sporadic cases
occurred. Until 2001, the most severely affected group was men over 15 years of age, whereas in 2004 and 2005, children under 5 years old were most affected. Notification is compulsory for all suspected cases (31).

Between 2007 and 2011, 734 cases of hantavirus were recorded in 14 of the 27 states of Brazil. The cases occurred mainly in men (median age, 32 years) living in the South region (40.8%) and the Southeast region (30.5%). People are usually infected in rural areas and probably acquire the infection in their place of work. Over the last five years, the case-fatality rate was 47.4%. Notification is compulsory for all cases of hantavirus (31).

During the first eight months of 2010, there were 8,366 cases of severe acute respiratory infection reported in hospitalized patients, and the diagnosis of 2009 pandemic influenza A(H1N1) was confirmed in 773 (9.2%) of these cases. The Southeast region had the highest proportion of the reported cases (3,971 of 8,366, or 47.5%), whereas the South had the highest proportion of the confirmed cases (307 of 773, or 39.7%). During that same period, 99 deaths from influenza A(H1N1) were confirmed. Among the confirmed deaths, the median age was 29 years (range, <1 year to 79 years), and a large majority of the fatalities (67.7%) were in females. Of the 67 deceased women, 46 of them (68.7%) were of reproductive age; of these 46, 23 of them (50.0%) were pregnant. Most of the cases occurred up through March 2011, with a marked reduction thereafter (31).

In Brazil, the magnitude of the issue of antimicrobial resistance has not been established, but some research has demonstrated a major impact of hospital-acquired infections caused by resistant pathogens (38). The country works with a national indicator of infection control: the incidence density of catheter-related primary bloodstream infections in patients admitted to intensive care units with 10 or more beds. Between January and December 2010, 18,370 such infections were reported: 10,889 (59.3%) in adult intensive care units, 1,525 (8.3%) in pediatric intensive care units, and 5,956 (32.4%) in neonatal intensive care units. The overall percentage of the reported infections that were laboratory-confirmed was 42.9%, with it being 40.7% in the adult intensive care units, 24.7% in the pediatric units, and 51.5% in the neonatal units.

**Chronic, Noncommunicable Diseases**

Chronic noncommunicable diseases are a major health problem that mainly affects the poor population and the most vulnerable groups. The process of demographic, epidemiological, and nutritional transition, as well as urban growth, have contributed to the current panorama. In 2009, out of 1,115,695 all-cause deaths recorded in Brazil, 742,779 (66.6%) were due to noncommunicable diseases. After correcting for underreporting and redistributing deaths due to ill-defined causes, this percentage increases to 72.4%. Cardiovascular diseases accounted for 31.3% of these deaths; malignant neoplasms, 16.2%; respiratory diseases, 5.8%; diabetes, 5.2%; and other noncommunicable diseases, 14.1%. Between 1991 and 2009, mortality due to noncommunicable diseases declined 26% (1.4% per year). The decrease, which was especially noticeable for cardiovascular and respiratory diseases, occurred in men and women alike, across all the regions of Brazil. In contrast, diabetes and cancer mortality increased in all the regions.

**Nutritional Diseases**

In Brazil, while 96% of children under 5 years old have been breast-fed at some point in time (21), the prevalence of exclusive breastfeeding in children aged 0 to 3 months is still low (45%). There has been an important reduction in the prevalence of child malnutrition, from 13% in 1996 to 7% in 2006 (21). Between 1975 and 2009, the prevalence of obesity surged from 2.8% to 12.5% in men and from 7.8% to 16.9% in women (39, 40). In addition, as of 2009, 50.1% of men and 48.0% of women were overweight. The prevalence of overweight and obesity has increased in the higher-income strata of the population; however, over the years, the gap in this rate between the rich and the poor has declined (40).
Accidents and Violence

External causes were the third leading cause of death (138,697 deaths) in 2009, and the number-one cause of death in the population aged 10 to 39 years. Accidents—especially motor vehicle accidents—and violence—especially homicides—accounted for most of this mortality (30). Among older adults (aged 60 and over), falls were the most frequent external cause of death (5,671 deaths in 2009).

In 2009, 52,066 deaths from homicide were recorded, with the majority occurring in young (aged 20 to 39) black or brown men with low educational levels (30). Homicide was the leading external cause of death in persons 15 to 39 years old, accounting for 39,506 deaths in this population. That same year, there were 37,635 deaths due to traffic accidents—mainly in men—and vehicular mortality was the leading cause of death in those 10 to 14 years old and also those 40 to 59 years old. There was a significant fall in mortality due to motor vehicle accidents beginning in 1998, but those rates have climbed back up since the start of the new millennium, fluctuating between 17.0 and 19.5 deaths per 100,000 population. Motorcycle accidents warrant particular attention, due to an extreme increase in mortality of more than 224% over a nine-year period. Deaths per 100,000 population rose from 1.5 in 2000 to 3.3 in 2005 and 4.9 in 2009 (30).

Risk and Protection Factors

Between 2006 and 2009, among men aged 18 and older living in the Brazilian state capitals, there were significant increases in the estimated prevalence of hypertension (from 18.4% to 21.1%), obesity (from 11.4% to 13.7%), and alcohol abuse (from 25.5% to 28.8%) (41, 42). Likewise, among women in the same age group during the same period, the prevalence of hypertension rose from 24.2% to 27.2%, that of obesity from 11.4% to 14.0%, that of alcohol abuse from 8.2% to 10.4%, and that of sedentary lifestyles from 11.6% to 15.3%. In 2009, the prevalence of smoking was higher among men aged 18 or older than among women in the same age group (19.0% vs. 12.5%). That pattern was also true for alcohol abuse (28.8% vs. 10.4%) and for the intake of high-fat meat (43.2% vs. 24.3%) (42). However, there was a similar prevalence of diabetes, obesity, and sedentary lifestyle among men (5.3%, 13.7%, and 16.0%, respectively) and women (6.2%, 14.0%, and 15.3%, respectively) aged 18 or older in the Brazilian state capitals.

Occupational Accidents and Diseases

In 2009, nearly 723,500 occupational injuries were reported to the National Institute of Social Security. Of the 528,200 recorded accidents with an associated report of occupational injury, 79.7% were typical workplace accidents, 16.9% were accidents occurring while en route between the home and the workplace, and 3.3% were occupational diseases. In 2009, the most frequently notified events were wrist and hand injuries (10.6%), wrist and hand fractures (6.5%), and back pain (6.4%). Occupational injuries were responsible for 89% of notifications made between 2007 and 2009. During the same period, repetitive strain injuries and work-related poisonings accounted for 6% and 2.6% of notifications, respectively, and other accidents, for <1% (43).

HEALTH POLICIES, THE HEALTH SYSTEM, AND SOCIAL PROTECTION

Although the Unified Health System (Sistema Único de Saúde, SUS) of Brazil has been in place for just a little over two decades, it has grown into a solid public health system and led to achieving satisfactory results for Brazilian society. The SUS recognizes health as a right and a responsibility of the State. The SUS is guided by the principles of universal and equitable access to services for the promotion, protection, and recovery of health, integrated in a regionalized, multilevel network under the responsibility of the three levels of government (federal, state, and municipal). The complementary role of the private sector is also recognized. The SUS operational guidelines call for decentralized management, integrated care, and community participation (44).
**The Health System's Performance**

The health sector consists of a broad and complex network of services that involves the participation of care providers and financial entities linked both to the public sector and to the private sector, including for-profit and nonprofit entities. According to 2008 data, the private health insurance system is very large, particularly in the South and Southeast regions, and provides coverage to nearly one-fourth of the population, an estimated 40 million people, of whom 44% are primary beneficiaries and 56% are dependents. The public health sector—that is, the SUS—provides universal access to health care. The SUS is the sole provider of health care coverage for at least 75% of the population, and it also serves a portion of those covered by private health plans. In addition, the SUS delivers services such as epidemiological surveillance, immunization, and endemic disease control to the entire population.

**Health Care Networks**

The Brazilian Constitution and the Organic Health Act provide for the establishment of health care networks. In December 2010, the Ministry of Health established directives for the structuring of health care networks throughout the country. This was a strategy to overcome the fragmentation of care and management in different health regions, to improve the political and institutional operation of the health system, and to ensure the provision of the services required by its users, with measurable parameters of effectiveness and efficiency. To promote equity between regions and states, care networks prioritize the most vulnerable populations according to socioeconomic status.

**Health Strategies and Programs**

The SUS Planning System is based on Health Plans for each level of government. The National Health Plan for the 2008–2009 period, approved by the National Health Council in 2009, takes into account guidance from various sources, including the final report of the 13th Health Conference, held in 2007; the 2006 Pact for Health; the commitments and priorities of the Ministry of Health; assessment reports of the 2004–2007 Multiyear Plan; and the Millennium Development Goals. The Plan has four objectives: a) to prevent and control disease, trauma, and health hazards; b) to expand access to health services with high-quality, comprehensive, equitable, and person-centered care; c) to promote activities directed to the prevention and the control of the determinants of health; and d) to strengthen management of the SUS at the three levels of government. These broad objectives are subdivided into 12 different guidelines that entail 71 challenges.

The SUS has a network of over 6,000 hospital facilities, with more than 400,000 beds, and more than 60,000 outpatient centers. It provides approximately 11.3 million hospitalizations, 2.3 million outpatient procedures, 215,000 heart surgeries, and 16,000 organ transplants every year. In 2010, its primary care strategy reached 5,272 municipalities of Brazil (94% of the total), with 30,996 family health teams, 19,609 oral health teams, and 238,304 community health agents. Between 2004 and 2008, the joint action of the SUS helped ensure that 48% of women over the age of 25 had mammograms and 87.1% of women aged 25 to 59 received cervical cancer screening.

**Health Legislation**

The legal framework and organization of the SUS require complex management processes, in view of the special characteristics of the Brazilian federation, which provides substantial autonomy to the country’s 27 states and more than 5,560 municipalities. Over the last 20 years, some articles of the Constitution have been amended so as to establish sharing of health funding responsibilities among the three levels of government.

Social participation in the SUS, as defined in the Organic Health Act (Law 8,142 of 1990), is carried out by means of health councils—present in nearly all municipalities and states—and health conferences, which are held every four years, with the participation of all three levels of government. The tasks for the
health councils include defining health strategies and monitoring the implementation of health policies.

**Health Expenditures and Financing**

The capacity for financing health systems has declined in most countries due to the demographic changes of recent decades (population aging as well as falling birth rates), the increased incidence of many chronic diseases that require long-term provision of resources, the constant introduction of new technologies and drugs, and, in some cases, the cost associated with violence and other external causes of death.

Since the 1988 Constitution was promulgated, the country has taken a major political step toward ensuring free, universal access to all health services, including the provision of drugs. Twenty years after its creation, the SUS is part of a social policy of the State that has transcended successive administrations. In 1988, an estimate was made for the resources needed for the policy program to be sustainable, and that objective has been achieved: the health of 75% of the Brazilian population relies entirely on the SUS. The public health budget information system shows that health expenditures funded by federal resources increased 29% between 2006 and 2008, while state and municipal expenditures rose from 52% in 2006 to 55% in 2008. One-third of all private health expenditures were made by companies that provide health services or health insurance to their employees and by domestic or foreign charitable organizations. The other two-thirds were out-of-pocket payments made by individuals and families for drug purchases (37%), payment of private health insurance (29%), dental services (17%), and other services (17%).

**Human Resource Development Policies**

Over the last few decades, Brazil has made an effort to expand the volume of human resources with technical capability so as to meet the growing demands of the Unified Health System (45). Among the challenges to managing health sector human resources are the need to attract health professionals and reduce turnover, the poor geographical distribution of health care providers, overspecialization and training, and resource management (46). Between 2006 and 2009, the number of positions offered in training programs increased in medicine (17.8%), dentistry (33.5%), and nursing (37.5%), and the number of registered physicians grew 9.8%. Following the general trend of elimination of informal labor, the number of formal job positions for nurses and dentists increased 37.2% and 16.5%, respectively.

Major inequalities in the distribution of health professionals have persisted, but with some recent improvements through gradual changes in medical training. For example, in 2006, of the 348,146 physicians practicing in Brazil, 57.5% were concentrated in the Southeast region, versus only 3.9% in the North. In 2009, the proportion was 51.8% of physicians practicing in the Southeast, and 7.8% in the North.

Efforts toward human resources reform have not been restricted to physicians. A recent study presented the main programs that the Ministry of Health implemented between 2006 and 2010 to train health care providers. Activities related to labor management have emphasized worker participation in management, including programs designed to end job insecurity; preparation of guidelines and directives; professionalization of management; implementation of plans for jobs, wages, and careers; and production of information to support management (45).

**The Health Services**

The SUS aims to ensure free access to drugs and health technology for the vast majority of the population. There is a national list of medicines, which is reviewed every two or three years, and a national formulary that provides guidance to physicians on the rational use of drugs. One of the challenges to the SUS is, with public funding, to continue to guarantee access to health services and
health technology for the entire population. The volume of drugs acquired by the Ministry of Health during the 2003–2009 period experienced an average annual increase on the order of 12.0%, while the pharmaceutical market grew at an annual rate of 12.9% between 2002 and 2009, and the national output of drugs, after a period of sustained decline, increased 20.1% between 2002 and 2009. As determined by the 1988 Constitution, all registered drugs must be available to Brazilian citizens, who can pursue legal action against public administrators if medicines are unavailable. This situation, known as the “judicialization” of health care, is increasingly common.

The National Health Surveillance Agency (ANVISA) is a key institution, at both the federal level and the state and municipal levels. ANVISA’s purpose is to ensure the performance of essential regulatory functions such as registration and marketing authorization, regulation of drug advertising, health technology assessment, and drug surveillance. In 2011, ANVISA was prequalified by the Pan American Health Organization as a reference national authority for drug regulation.

There is a growing demand for novel drugs and technology and for medicines to treat chronic diseases such as diabetes and hypertension. These trends create new challenges for public managers, including, for example, expanding the range of services provided by the Government’s Farmácia Popular (People’s Pharmacy) network.

On average, 9 million chemotherapy and radiation therapy procedures (468 per 10,000) are carried out annually in Brazil. Each year there are also 300 million laboratory tests (1.9 per person); 1 million computed tomography scans (52 per 10,000); 160,000 magnetic resonance imaging scans (8 per 10,000); 6.5 million ultrasound tests (338 per 10,000); and 8 million dialysis sessions (417 per 10,000).

HEALTH AND INTERNATIONAL COOPERATION

Technical cooperation in health is an instrument of Brazilian foreign policy and an effective tool to achieve the country’s objectives in the international arena. International cooperation was one of the linchpins of the 2008–2010 National Health Policy, and it contributed to the development of a sustainable health system. While 39% of cooperation is geared to South America and another 39% to the Caribbean (especially Haiti), 88% of financial resources are invested in Portuguese-speaking African countries.

Cooperation with Latin American and Caribbean nations focuses on training and on the sharing of experiences among countries. Cooperation with African nations, in turn, includes training activities done in combination with the donation of health supplies and equipment, restructuring or reconstruction of health care facilities, and knowledge transfer, given that this blending of health care provider training and technology transfer is of particular importance in these countries.

Brazil is involved in horizontal, or South-South, cooperation, also known as structure-building health cooperation. It is essentially based on training for development, so that these cooperative efforts are integrated into the structures of the receiving country (47). MERCOSUR continues to be one of Brazil’s priorities. International security is also of special interest to Brazil, which, since 2004, has led the United Nations Stabilization Mission in Haiti.

SYNTHESIS AND PROSPECTS

In recent decades, Brazil has made substantial improvements in living conditions and in the state of health of the population. This progress is associated with the political, economic, and social changes that have benefited the country. Nevertheless, major challenges remain. Among the issues facing the health sector and society as a whole are the need to reduce the burden of neglected diseases as well as delays with environmental agreements and with sanitation improvements, especially in rural areas. There are marked inequalities in health indicators between the wealthy and the poor, the white and black and indigenous populations, urban and rural areas, and men and
women. On the other hand, it is important to stress the positive impact of very successful policies, such as the SUS and the PBF. The debate on how successful these policies have actually been in improving living conditions and reducing social inequality constitutes an incentive to tackling the health challenges that Brazil currently faces.

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