

The situation is even worse in many African countries, where AIDS and other communicable diseases are killing people at a terrible rate. In Zimbabwe, Botswana, Zambia, and Namibia, for example, up to 30 percent of the adult population have AIDS or are HIV positive. Health officials predict that more than two-thirds of the 15-year-olds now living in Botswana will die of AIDS before age 50. Many of these countries are soon expected to have declining populations. Overall, however, Africa is expected to grow by at least 1.5 billion over the next century.

The human density map in Appendix 3 on p. 374 shows human population distribution around the world. Notice the high densities supported by fertile river valleys of the Nile, Ganges, Yellow, Yangtze, and Rhine Rivers and the well-watered coastal plains of India, China, and Europe. Historic factors, such as technology diffusion and geopolitical power, also play a role in geographic distribution.

Fertility and Birth Rates

Fecundity is the physical ability to reproduce, while fertility describes the actual production of offspring. Those without children may be fecund but not fertile. The most accessible demographic statistic of fertility is usually the **crude birth rate**, the number of births in a year per thousand persons. It is statistically "crude" in the sense that it is not adjusted for population characteristics, such as the number of women of reproductive age.

The **total fertility rate** is the number of children born to an average woman in a population during her entire reproductive life. Upper-class women in seventeenth- and eighteenth-century Europe, whose babies were given to wet nurses immediately after birth and who were expected to produce as many children as possible, often had 25 or 30 pregnancies. The highest recorded total fertility rates for working-class people are among some Anabaptist agricultural groups in North America, who have averaged up to 12 children per woman. In most tribal or traditional societies, food shortages, health problems, and cultural practices limit total fertility to about six or seven children per woman, even without modern methods of birth control.

Fertility is usually calculated as births per woman because, in many cases, establishing paternity is difficult. Nevertheless, a few demographers argue that we should pay more attention to birth rates per male because, in some cultures men have far more children, on average, than do women. In Cameroon, for instance, due to multiple marriages, extramarital affairs, and a high rate of female mortality, men are estimated to have 8.1 children in their lifetime, while women average only 4.8.

Zero population growth (ZPG) occurs when births plus immigration in a population just equal deaths plus emigration. It takes several generations of replacement level fertility (where people just replace themselves) to reach ZPG. Where infant mortality rates are high, the replacement level may be five or more children per couple. In the more highly developed countries, however, this rate is usually about 2.1 children per couple because some people are infertile, have children who do not survive, or choose not to have children.

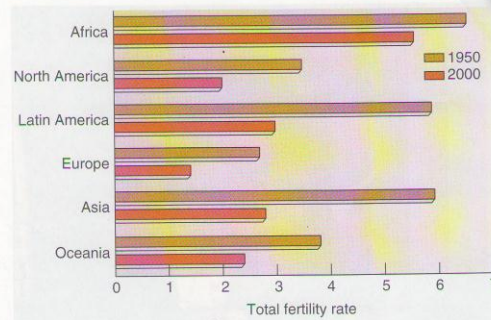


FIGURE 4.5 Declines in fertility rates by region, 1950 and 2000. Source: Data from Population Reference Bureau, 2002.

Fertility rates have declined dramatically in every region of the world except Africa over the past 50 years (fig. 4.5). In the 1960s, total fertility rates above six were common in many countries. The average family in Mexico in 1975, for instance, had seven children. By 2000, however, the average Mexican woman had only 2.5 children. According to the World Health Organization, 61 of the world's 190 countries are now at or below a replacement rate of 2.1 children per couple. The greatest fertility reduction has been in Southeast Asia, where rates have fallen by more than half, primarily in the past few decades. Contrary to what many demographers expected, some of the poorest countries in the world have been remarkably successful in lowering growth rates. Bangladesh, for instance, reduced its fertility rate from 6.9 in 1980 to only 3.1 children per woman in 1998.

China's one-child-per-family policy decreased the fertility rate from six in 1970 to 1.8 in 1990. This policy, however, has sometimes resulted in abortions, forced sterilizations, and even infanticide. Another adverse result is that the only children (especially boys) allowed to families may grow up to be spoiled "little emperors" who have an inflated impression of their own importance (fig. 4.6). Furthermore, there may not be enough workers to maintain the army, sustain the economy, or support retirees when their parents reach old age.

Although the number of boys and girls normally should be fairly balanced in a population, 20 years of female infanticides and sex-based abortions in China have created ratios as high as 140 boys to 100 girls in some regions. This shortage of women has created a flourishing trade in abducted brides. A crackdown in 2002 released 110,000 women who had been kidnapped and sold into marriage, but it's thought that the total number abducted is much higher.

While the world as a whole still has an average fertility rate of 2.7, growth rates are now lower than at any time since World War II. If fertility declines like those in Bangladesh and China were to occur everywhere in the world, our total population could begin to decline by the end of the twenty-first century. Interestingly,

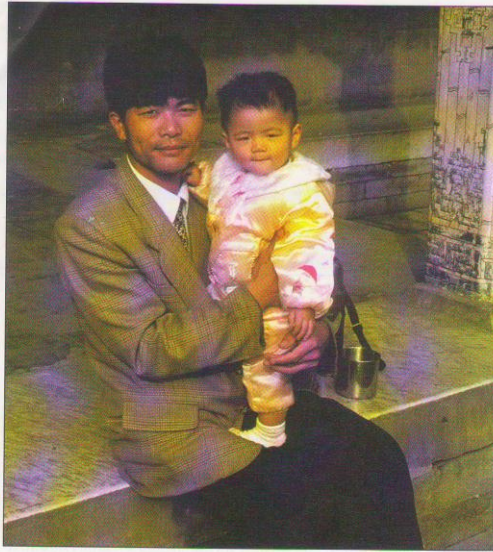


FIGURE 4.6 China's one-child-per-family policy has been remarkably successful in reducing birth rates. It may, however, have created a generation of "little emperors," since parents and grandparents focus all their attention on an only child.

Spain and Italy, although predominately Roman Catholic, have the lowest reported fertility rates (1.2 children per woman) of any countries.

Mortality and Death Rates

A traveler to a foreign country once asked a local resident, "What's the death rate around here?" "Oh, the same as anywhere," was the reply, "about one per person." In demographics, however, **crude death rates** (or crude mortality rates) are expressed in terms of the number of deaths per thousand persons in any given year. Countries in Africa where health care and sanitation are limited may have mortality rates of 20 or more per 1,000 people. Wealthier countries generally have mortality rates around 10 per 1,000. The number of deaths in a population is sensitive to the population's age structure. Rapidly growing, developing countries, such as Belize or Costa Rica, have lower crude death rates (four per 1,000) than do the more-developed, slowly growing countries, such as Denmark (12 per 1,000). This is because a rapidly growing country has proportionately more youths and fewer elderly than a more slowly growing country. Declining mortality, not rising fertility, is the primary cause of most population growth in the past 300 years. Crude death rates began falling in Western Europe during the late 1700s.

Life Span and Life Expectancy

Life span is the oldest age to which a species is known to survive. Although there are many claims in ancient literature of kings living for a thousand years or more, the oldest age that can be certified by written records was that of Jeanne Louise Calment of Arles, France, who was 122 years old at her death in 1997. With modern medicine has made it possible for many of us to survive much longer than our ancestors, it doesn't appear that the maximum life span has increased much at all. Apparently, cells in our bodies have a limited ability to repair damage and produce new components. Sooner or later they simply wear out, and we fall victim to disease, degeneration, accidents, or senility.

Life expectancy is the average age that a newborn infant can expect to attain in any given society. It is another way of expressing the average age at death. For most of human history, life expectancy in most societies probably has been 35 to 40 years. This doesn't mean that no one lived past age 40, but rather that many people died at earlier ages (mostly early childhood), which balanced out those who managed to live longer.

The twentieth century has seen a global transformation in human health unmatched in history. This revolution can be seen in the dramatic increases in life expectancy in most places (table 4.3). Worldwide, the average life expectancy has risen from about 40 to 65.5 years over the past century. The greatest progress has been in developing countries. For example, in 1900, the average Indian man could expect to live less than 23 years, while the average woman would reach just over 23 years. By 2000, although India had an annual per capita income of less than \$440 (U.S.), its average life expectancy for both men and women had nearly tripled and was very close to that of countries with ten times the income level. Longer lives were due primarily to better nutrition, improved sanitation, clean water, and education, rather than to miracle drugs or high-tech medicine. While the gains were not as great for the already industrialized countries, residents of the United States, Sweden, and Japan, for example, now live about half-again as long as they did at the beginning of the twentieth century, and they can expect to enjoy much of that life in relative

TABLE 4.3 Life Expectancy at Birth for Selected Countries in 1900 and 2000

COUNTRY	1900		2000	
	MALES	FEMALES	MALES	FEMALES
India	22.6	23.3	60.3	60.5
Japan	42.4	43.7	77.4	84.2
Russia	30.9	33.0	61.7	73.6
Sweden	56.6	59.5	77.0	82.1
United States	45.6	48.3	74.7	79.3

Source: Data from Population Reference Bureau, 2002.

good health. The Disability Adjusted Life Years (DALYs) that someone living in Japan can expect is now 74.5 years, compared to only 64.5 DALYs two decades ago.

As figure 4.7 shows, annual income and life expectancy are strongly correlated up to about \$4,000 (U.S.) per person. Beyond that level—which is generally enough for adequate food, shelter, and sanitation for most people—life expectancies level out at about 75 years for men and 80 for women. Russia is a striking exception to this pattern. With a gross national product per person of near \$5,000 (U.S.), Russian life expectancy is only 58 years for men and 71 for women. Russian men now live about 14 years less, on average, than they did before the breakup of the USSR. As mentioned earlier, a disastrous economy, alcoholism, poor nutrition, and substandard medical care have all contributed to this decline.

Large discrepancies in how the benefits of modernization and social investment are distributed within countries are revealed in differential longevities of various groups. The greatest life expectancy reported anywhere in the United States is for women in Stearns County, Minnesota, who live to an average age of 86. By contrast, Native American men on Pine Ridge Indian Reservation in neighboring South Dakota, live, on average, only to age 45. Only a few countries in Africa have a lower life expectancy. The Pine Ridge Reservation is the poorest area in America, with an unemployment rate near 75 percent and high rates of poverty, alcoholism, drug use, and alienation. Similarly, African-American men in Washington, D.C. live, on average, only 57.9 years, which is less than life expectancies in Lesotho or Swaziland.

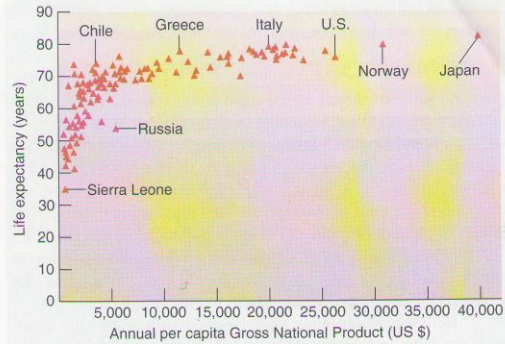


FIGURE 4.7 As incomes rise, so does life expectancy up to about \$4,000 (U.S.). Russia is an exception, with a life expectancy nearly 20 years less than that of Chile, even though their gross national products are about the same.

Sources: The World Bank, *World Development Indicators 1997*, the World Bank, Washington, D.C., 1997; United Nations (UN) Population division; *World Population Prospects, 1950–2050 (The 1996 Revision)* UN, New York, 1996.

Living Longer: Demographic Implications

A population growing rapidly by natural increase has more young people than does a stationary population. One way to show these differences is to graph age classes in a histogram, as figure 4.8 shows.

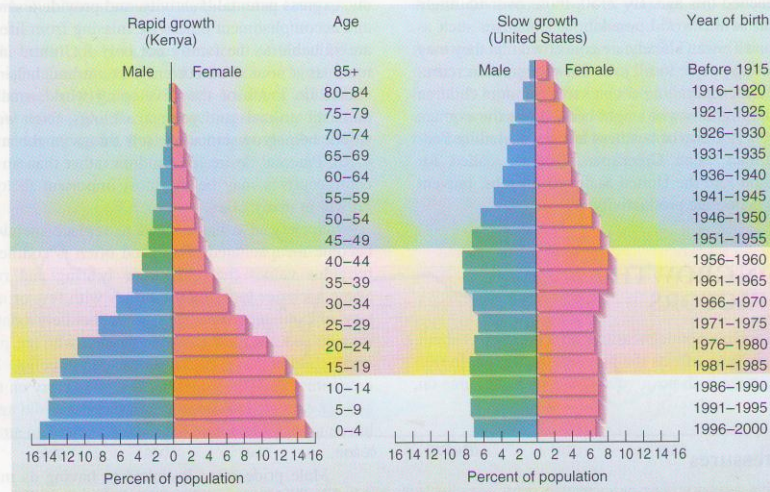


FIGURE 4.8 Population by age and sex in rapidly growing and slowly growing countries. Middle regions represent individuals of reproductive ages. Note the high proportion of children in the rapidly growing population and the high proportion of elderly in the slowly growing population.

Sources: Data from the U.S. Bureau of the Census, the United Nations, and the Population Reference Bureau.

In Kenya, which is growing at a rate of 2.5 percent per year, 42 percent of the population is in the prereproductive category (below age 15). Even if total fertility rates fell abruptly, the total number of births, and the population size, would continue to grow for some years as these young people enter reproductive age. This phenomenon is called population momentum.

A population that has recently entered a slower growth rate pattern, such as the United States, will have a bulge in the age classes for the last high-birth rate generation. Notice in figure 4.8 that females outnumber males in the older age group in the United States because of differences in longevity between the sexes. After a country has had a stable population for many years, it will have approximately the same numbers in all age classes, and the columns will be nearly uniform from top to bottom.

Both rapidly growing countries and slowly growing countries can have a problem with their **dependency ratio**, or the number of nonworking compared to working individuals in a population. In Mexico, for example, each working person supports a high number of children. In the United States, by contrast, a declining working population is now supporting an ever larger number of retired persons. In 1970, the median age in the United States was 30, and there were four workers for every retired person. By 2100, if current trends continue, the median age could be over 60. If workers continue to retire at age 65, half of the population could be unemployed, and retirement could last 35 or 40 years.

This changing age structure and shifting dependency ratio are occurring worldwide (fig. 4.9). In 1950, there were only 130 million people in the world over 65 years old. In 2000, more than 420 million had reached this age. By 2150, those over 65 might make up 25 percent of the world population. Countries such as Japan, Singapore, and Taiwan already are concerned that they may not have enough young people to fill jobs and support their retirement system. They are encouraging couples to have more children and are recruiting immigrants who might bring down the average age of the population. A group of business leaders, including Federal Reserve chairman, Alan Greenspan, recently called for increased immigration into the United States to fill jobs, prevent inflation, and boost economic productivity.

POPULATION GROWTH: OPPOSING FACTORS

A number of social and economic pressures affect decisions about family size, which, in turn, affects the population at large. In this section, we will examine both positive and negative pressures on reproduction.

Pronatalist Pressures

Factors that increase people's desires to have babies are called **pronatalist pressures**. Raising a family may be the most enjoyable and rewarding part of many people's lives. Children can be a source of pleasure, pride, and comfort. They may be the only

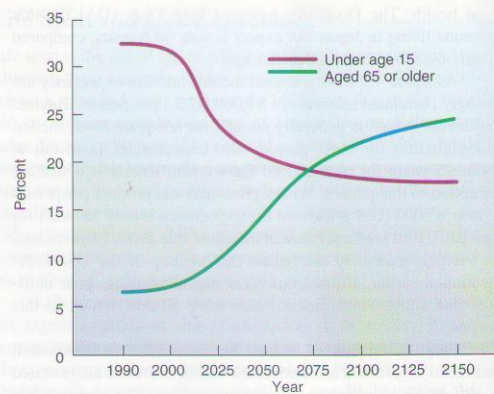


FIGURE 4.9 Changing age structure of world population. In the twenty-first century, children under age 15 will make up a smaller percentage of world population, while people over age 65 will make up a rapidly rising share of the population.

source of support for elderly parents in countries without a social security system. Where infant mortality rates are high, couples may need to have many children to ensure that at least a few will survive to take care of them when they are old. Where there is little opportunity for upward mobility, children give status in society, express parental creativity, and provide a sense of continuity and accomplishment otherwise missing from life. Often children are valuable to the family not only for future income, but even more as a source of current income and help with household chores. In much of the developing world, small children tend domestic animals and younger siblings, fetch water, gather firewood, help grow crops, or sell things in the marketplace (fig. 4.10). Parental desire for children rather than an unmet need for contraceptives may be the most important factor in population growth in many cases.

Society also has a need to replace members who die or become incapacitated. This need often is codified in cultural or religious values that encourage bearing and raising children. Some societies look upon families with few or no children with pity or contempt. The idea of deliberately controlling fertility may be shocking, even taboo. Women who are pregnant or have small children have special status and protection. Boys frequently are more valued than girls because they carry on the family name and are expected to support their parents in old age. Couples may have more children than they really want in an attempt to produce a son.

Male pride often is linked to having as many children as possible. In Niger and Cameroon, for example, men, on average, want 12.6 and 11.2 children, respectively. Women in these countries consider the ideal family size to be only about half of what their husbands desire. Even though a woman might desire fewer