CHAPTER 2

Population

Field Note Where Are the Children?

Figure 2.1
Bordeaux, France. People stroll through the historic streets of Bordeaux, France. ©H. J

My mind was on wine. I was in Bordeaux, France, walking down the street t Bordeaux Wines Museum (Musée des Vins de Bordeaux) with a friend fror city. Having just flown from Dakar, Senegal, after spending several wee Subsaharan Africa, I found my current surroundings strikingly different. Obse the buildings and the people around me, I noticed that after having been amc many young children in Subsaharan Africa, the majority of the inhabitants countered in Bordeaux were of an aging population.

I turned to my friend and asked, "Where are all the children?" He lc around, pointed, and replied, "There goes one now!"

In Bordeaux, in Paris, in all of France and the rest of Europe, children are and populations are aging (Fig. 2.1). To reach replacement levels—to keep a pc

tion stable over time without immigration—the women of childbearing age in a country need a total fertility rate (TFR) of 2.1. The TFR reports the average number of children born to a woman of childbearing age. At the beginning of this century, more than 60 countries, containing 45 percent of the world's population, had fallen below this replacement level (Fig. 2.2).

In the 1980s, in the midst of a population explosion, Kenya recorded one of the highest TFRs ever, 8.1. Today, parts of Italy are recording the lowest TFRs ever, as low as 0.8 in Bologna. Not a single country in Europe is above replacement levels at present. By 2030, people in Germany over 65 may well account for nearly half the adult population, as compared with one-fifth now. Many other European countries are on a similar trajectory, and even countries with large populations, such as Brazil and China will likely experience substantial aging of the population as their growth rates decline.

Why are women having fewer children? In wealthier countries, more women are choosing to stay in school, work on careers, and marry later, delaying childbirth. Couples worry about the higher cost of raising children and delay starting a family in order to be better prepared financially. In some countries, such as China, governments are administrating lower birth rates. In other countries, such as India, cultural costs associated with having children, such as providing dowries for girls, are resulting in higher abortion rates, particularly if the fetus is a girl.

An aging population requires substantial social adjustments. Older people retire and eventually suffer health problems, so they need pensions and medical care. The younger workers in the population must work in order to provide the tax revenues to enable the state to pay for these services. As the proportion of older people in a country increases, the proportion of younger people decreases. Thus, fewer young workers are providing tax revenues to support programs providing services for more retired people. To change the age distribution of an aging country and provide more taxpayers, the only answer is immigration: influxes of younger workers to do the work locals are unable (or unwilling) to do. The United States has used immigration in recent decades to help sustain the economic boom of the late twentieth century. Yet, immigration can create its own set of social issues, as has already happened in Germany with its large Turkish and Kurdish immigration, in France with its Algerian-Muslim influx, and in the United States with the arrival of immigrants from Latin America.

What will happen when a country resists immigration despite an aging population? Over the next half-century, Japan will be an interesting case study. Japan's population will begin declining sometime between now and 2007, and projections indicate the Japanese population will decline as it ages, falling from over 127 million in 2007 to below 100 million in 2050 (some predictions are as low as 67 million by 2050). Japan was a closed society for hundreds of years and even today, the Japanese government discourages immigration and encourages homogeneity of the population. More than 98 percent of the country's population is Japanese, according to government statistics. The British newspaper *The Guardian* reported that the Japanese government's efforts to maintain the homogeneity of the population are often "lauded domestically as a reason for the country's low crime rate" and strong industrial economy.

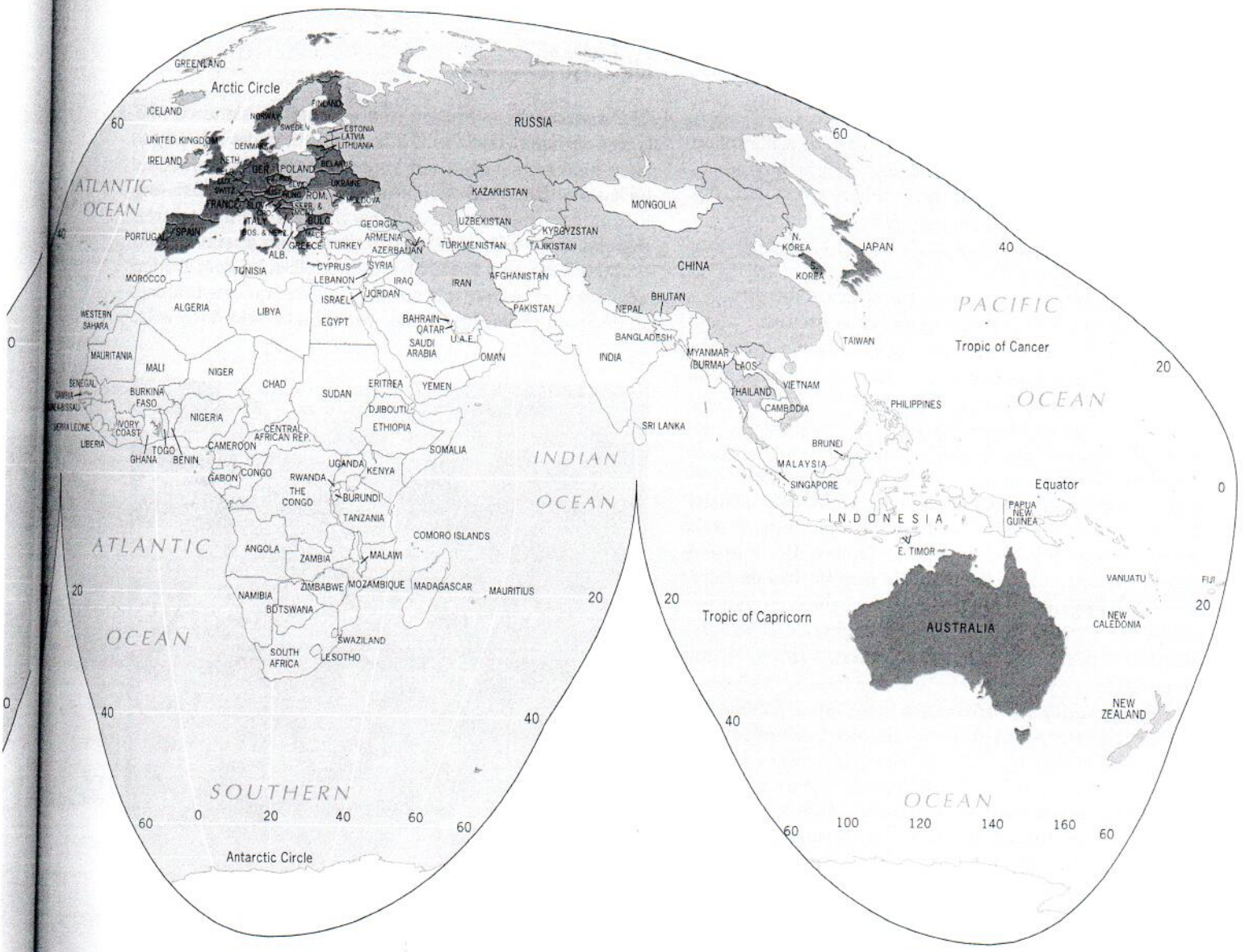
Today, TFRs are falling almost everywhere on Earth, in large part because of family planning. In some countries fertility rates are declining dramatically. Kenya's TFR is now down to 5.0; China's fell from 6.1 to 1.7 in just 30 years. Once the government of Iran began to allow family planning, the TFR fell from 6.8 in 1980 to 2.5 in 2004.

Figure 2.2
Year that Total Fertility Rate Among Women Fell Below Replacement Levels. *Data from*: World Bank, World Development Indicators, 2004.

Having a low TFR was once a status symbol—a goal few governments were able to reach. Realizing now that a young, working population is a necessity for providing tax revenues to support the aging population, governments are getting creative. Countries that desire a larger, younger population, such as Sweden, are providing major financial incentives, like year-long, paid maternity leaves and state-funded daycare, to encourage women to have children.

These programs have had limited success in encouraging sustained population growth. When you walk down the streets of Stockholm, Sweden or Bordeaux, France today, you may ask yourself, "Where are all the children?"

In this chapter, we discuss where people live and why they live where they do. We also examine the rising world population and contrast it with the aging



population within particular regions and countries. We look at the ramifications of population change, and we question how governments affect population change.

Key Questions For Chapter 2

1. Where in the world do people live and why?
2. Why do populations rise or fall in particular places?
3. Why does population composition matter?
4. How do governments affect population change?

WHERE IN THE WORLD DO PEOPLE LIVE AND WHY?

When geographers study population, we explain population traits across space. Demography is the study of population, and population geographers work with demographers, asking why demographic problems vary not only from region to region and country to country, but also within countries.

Demographers report the **population density** of a country as a measure of total population relative to land size (Fig. 2.3). Population density assumes an even distribution of the population over the land. The United States, for example, with a territory of 3,717,425 square miles or 9,629,167 square kilometers (including the surfaces of lakes and ponds and coastal waters up to three nautical miles from shore) had a population of 294.5 million in 2004. This yields an average population density for the United States of just over 79 per square mile (30.5 per square kilometer). This density figure is also known as the country's **arithmetic population density**, and in a very general way it emphasizes the contrasts between the United States and such countries as Bangladesh (2542 per square mile), the Netherlands (1033), and Japan (875).

No country has an evenly distributed population, and arithmetic population figures do not reflect the emptiness of most of Alaska and the sparseness of population in much of the West. In other cases, it is actually quite misleading. Egypt, with a population of 73.3 million in 2004, has a seemingly moderate arithmetic population density of 190 per square mile. Egypt's territory of 386,660 square miles, however, is mostly desert, and the vast majority of the population is crowded into the valley and delta of the Nile River. An estimated 98 percent of all Egyptians live on just 3 percent of the country's land, so, the arithmetic population density figure is meaningless in this case (Fig. 2.4 top, bottom).

Physiologic Population Density

A superior index of population density relates the total population of a country or region to the area of *arable* (farmable) land it contains. This is called the **physiologic population density**, defined as the number of people per unit area of agriculturally productive land. Take again the case of Egypt. Although millions of people live in its great cities (Cairo and Alexandria) and smaller urban centers, the irrigated farmland is densely peopled as well. When the entire population is divided in Egypt's confined arable land, the resulting physiologic density figure for the year 2004 is 6319 per square mile. This number is far more reflective of Egypt's population pressure, and it continues to rise rapidly despite Egypt's efforts to expand its irrigated farmlands.

Appendix B (at the end of this book) provides complete data on both arithmetic and physiologic population densities, and some of the data stand out markedly. Mountainous Switzerland's high physiologic density should be

Field Note

"No matter where you are, the Indonesian island of Java leaves no doubt that this is one of the most densely populated places on Earth. The back roads I traveled seemed to be lined with houses for endless miles, the houses clustering into villages and towns every few minutes. Here in Jakarta, the capital of Indonesia, the crush of people reminds you that this is the world's fourth most populous country. During much of the day, traffic is so congested that it crawls along, so that pedestrians simply mix with road vehicles."

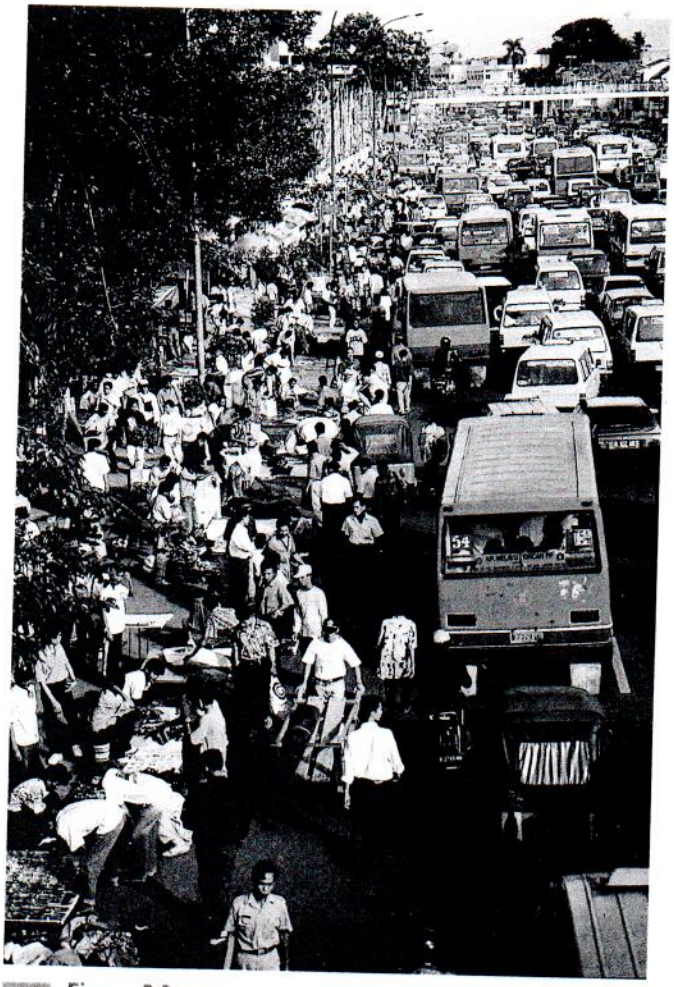


Figure 2.3
Jakarta, Indonesia. © H. J. de Blij.

Field Note

"The contrasting character of the Egyptian landscape could not be more striking. Along the Nile River, the landscape is one of green fields, scattered trees, and modest houses, as along this stretch of the river's west bank near Luxor (Fig. 2.4 top). But anytime I wander away from the river, brown, wind-sculpted sand dominates the scene as far as the eye can see (Fig. 2.4 bottom). Where people live and what they do is not just a product of culture; it is shaped by the physical environment as well."

Figure 2.4 top
Luxor, Egypt. © Alexander B. Murphy.

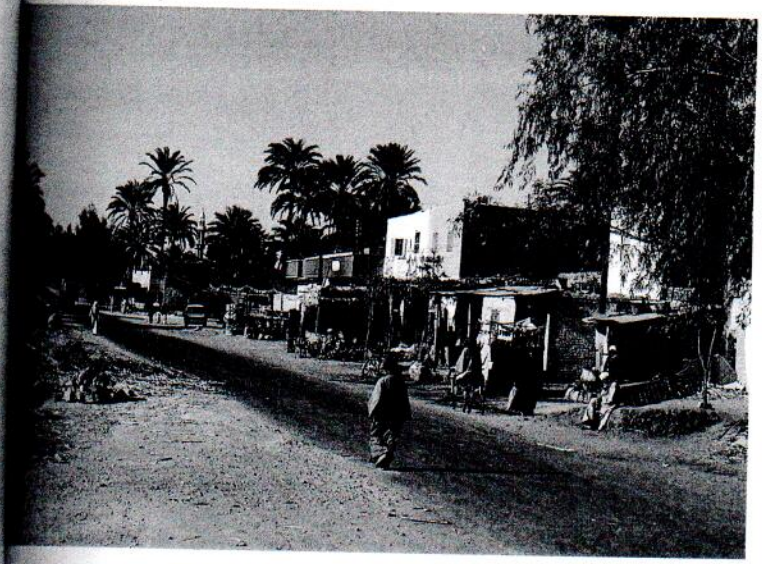


Figure 2.4 bottom
Luxor, Egypt. © Alexander B. Murphy.

expected: it is 10 times as high as its arithmetic density. But note Ukraine, with its vast farmlands: its physiologic density is only 1.7 times as high as its arithmetic density. Also compare the high physiologic densities in Middle America (see Puerto Rico) to the moderate data for South America, where Argentina has one of the lowest indices in the world. Furthermore, note that India's physiologic density is the lowest in South Asia despite its huge population (and is less than twice as high as its arithmetic density), whereas China's physiologic density in 2002 was almost 10 times higher. Both China and India have populations over 1 billion, but according to the physiologic density, India has much more arable land per person than China.

Population Distribution

People are not distributed evenly across the world or within a country. One-third of the world's population lives in China and India. Yet, each country has large expanses of land (the Himalayas in India and a vast interior desert in China) where people are absent or sparsely distributed. In addition to studying population densities, geographers study **population distributions**, descriptions of locations on the Earth's surface where individuals or groups (depending on the scale) live. Geographers represent population distributions on **dot maps**, maps where one dot represents a certain number of a population. At the local scale, a dot map of population can show each individual farm in a sparsely populated rural area. At the global scale, the data are much more generalized. In the following section of this chapter, we study a dot map of the global population.

World Population Distribution and Density

From the very beginning, people have been unevenly distributed over the land, and the contrasts between crowded countrysides and bustling cities on the one hand and empty reaches on the other hand have only intensified. Historically, people tended to congregate in places where they could grow food—making for a high correlation between arable land and population density. Cities began in agricultural areas, and for most of history, people lived closest to the most agriculturally productive areas. In recent history, advances in agricultural technology and in transportation of agricultural goods are beginning to change this pattern, but the inertia of the older pattern is still evident.

At the global scale, where one dot on a map represents 100,000 people, three major clusters of population jump out (Fig. 2.5). Each of the three largest population clusters is on the Eurasian landmass. The fourth largest is in North America.

East Asia

Although the distribution map (Fig. 2.5) requires no color contrasts, Figure 2.6 depicts population density through shading: the darker the color, the larger the number of people per unit area. The most extensive area of dark shading lies in East Asia, primarily in China but also in Korea and Japan. About one-quarter of the world's population is concentrated here—nearly 1.3 billion people in China alone.

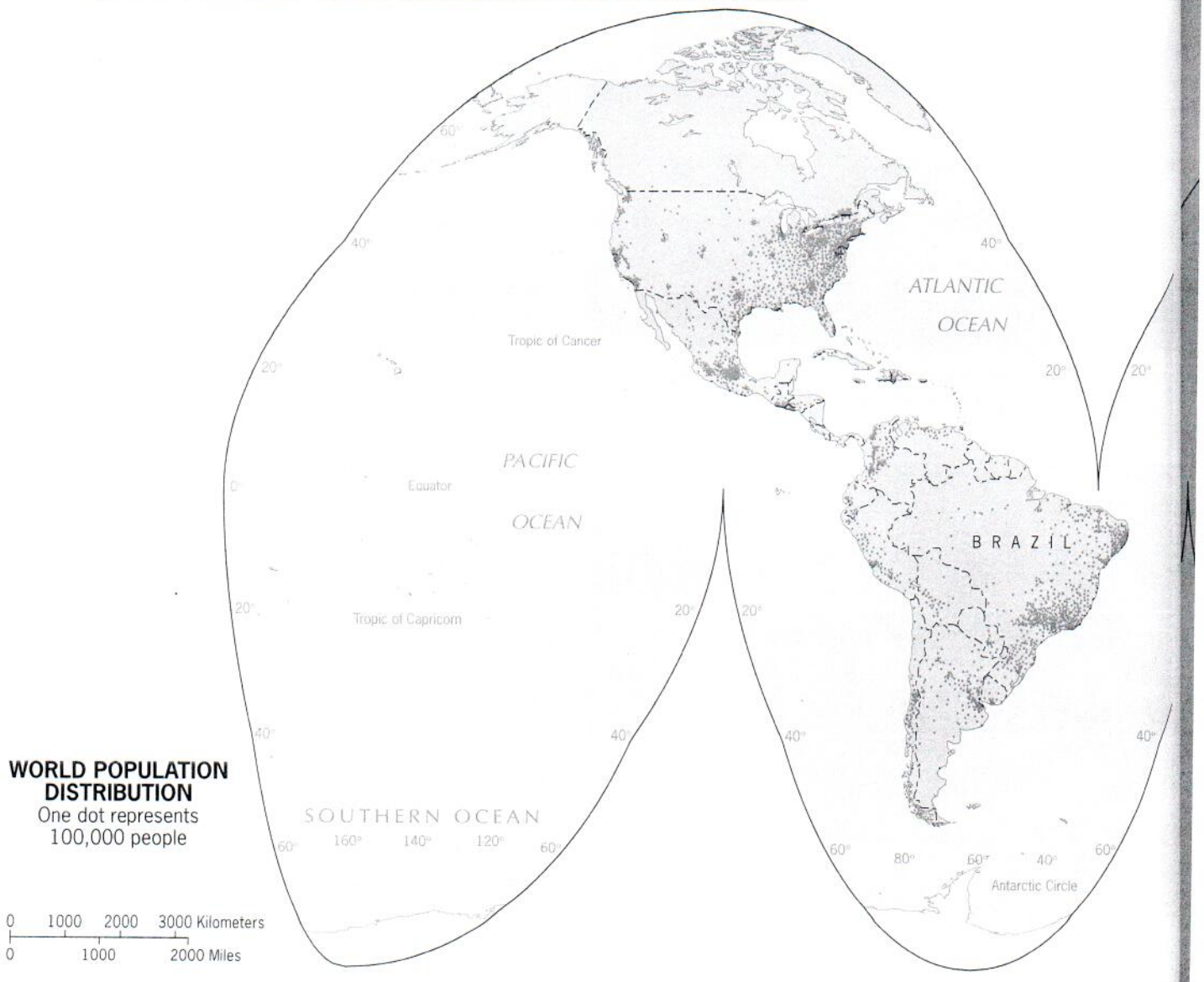
In addition to high population density in China's large cities, ribbons of high population density extend into the interior along the Yangtze and Yellow River Valleys. Farmers along China's major river valleys produce crops of wheat and rice to feed not only themselves but also the population of major cities like Shanghai and Beijing.

South Asia

The second major population concentration also lies in Asia and is similar in many ways to that of East Asia. At the heart of this cluster of 1.5 billion people lies India. The concentration extends into Pakistan and Bangladesh and onto the island of Sri Lanka. Here, people again cluster in major cities, on the coasts, and along rivers, such as the Ganges and Indus.

Two physical geography barriers create the boundaries of the South Asia population cluster: the Himalaya Mountains to the north and the desert west of the Indus River Valley in Pakistan. This is a confined region with a rapidly growing population. As in East Asia, the overwhelming majority of the people here are farmers, but in

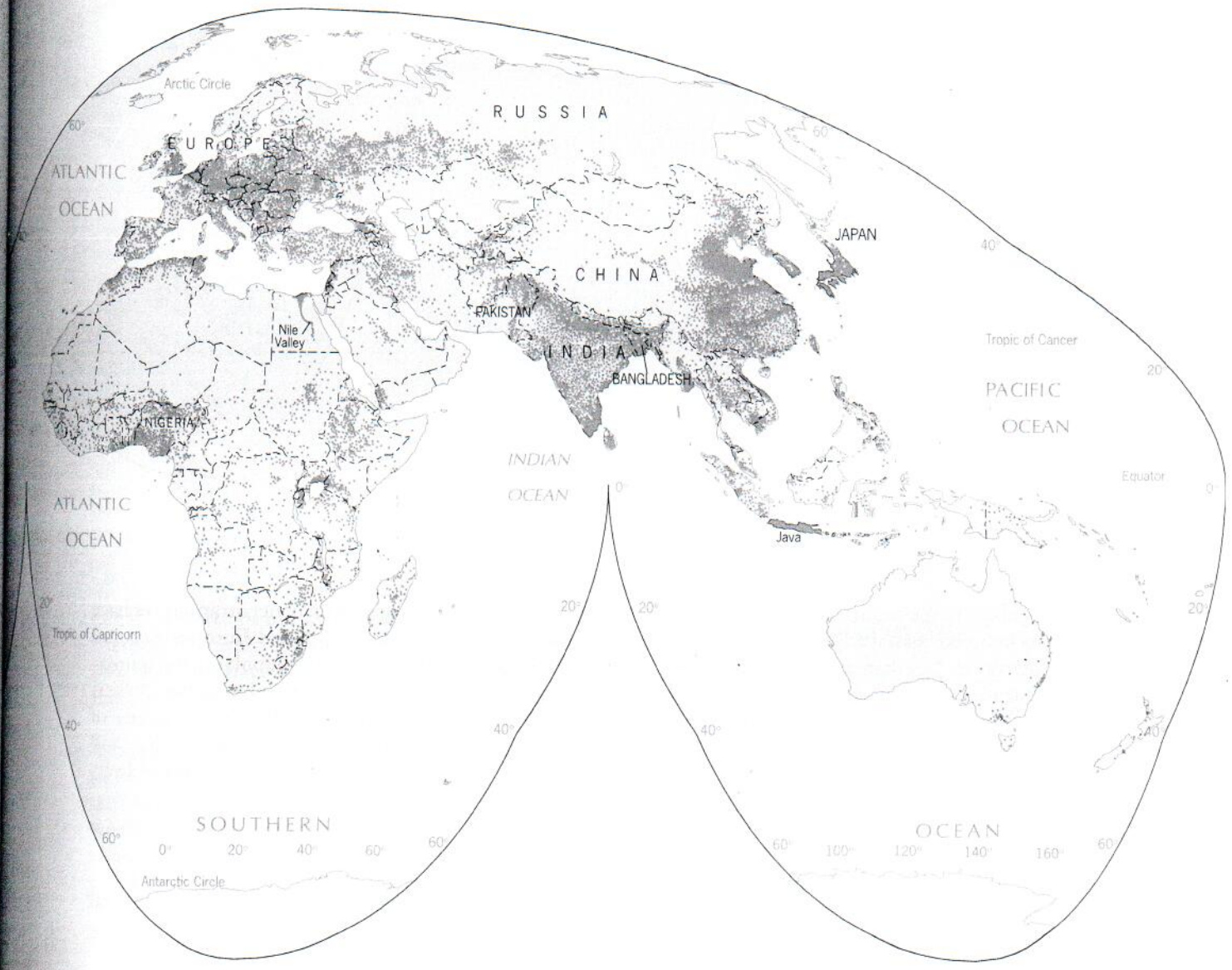
Figure 2.5
World Population Distribution. © H. J. de Blij, A. B. Murphy, E. H. Fouberg, and John Wiley & Sons, Inc.



South Asia the pressure on the land is even greater. In Bangladesh, over 141 million people, almost all of them farmers, are crowded into an area about the size of Iowa. Over large parts of Bangladesh the rural population density is between 3000 and 5000 people per square mile. By comparison, in 2003 the population of Iowa was about 3 million people, and the rural population density was under 30 people per square mile.

Europe

An axis of dense population extends from Ireland and Great Britain into Russia and includes large parts of Germany, Poland, Ukraine, and Belarus. It also includes the Netherlands and Belgium, parts of France, and northern Italy. This European cluster contains over 728 million inhabitants, which puts it in a class with the South Asia concentration—but there the similarity ends. A comparison of the population and physical maps indicates that in Europe terrain and environment are not as closely related to population distribution as they are in East and South Asia. For example, note the lengthy extension in Figure 2.5, which protrudes far into Russia. Unlike the Asian extensions, which reflect fertile river valleys, the European extension reflects the orientation of Europe's coal fields. If you look closely at the physical map, you will note that comparatively dense population occurs even in mountainous, rugged country, such as the boundary zone between



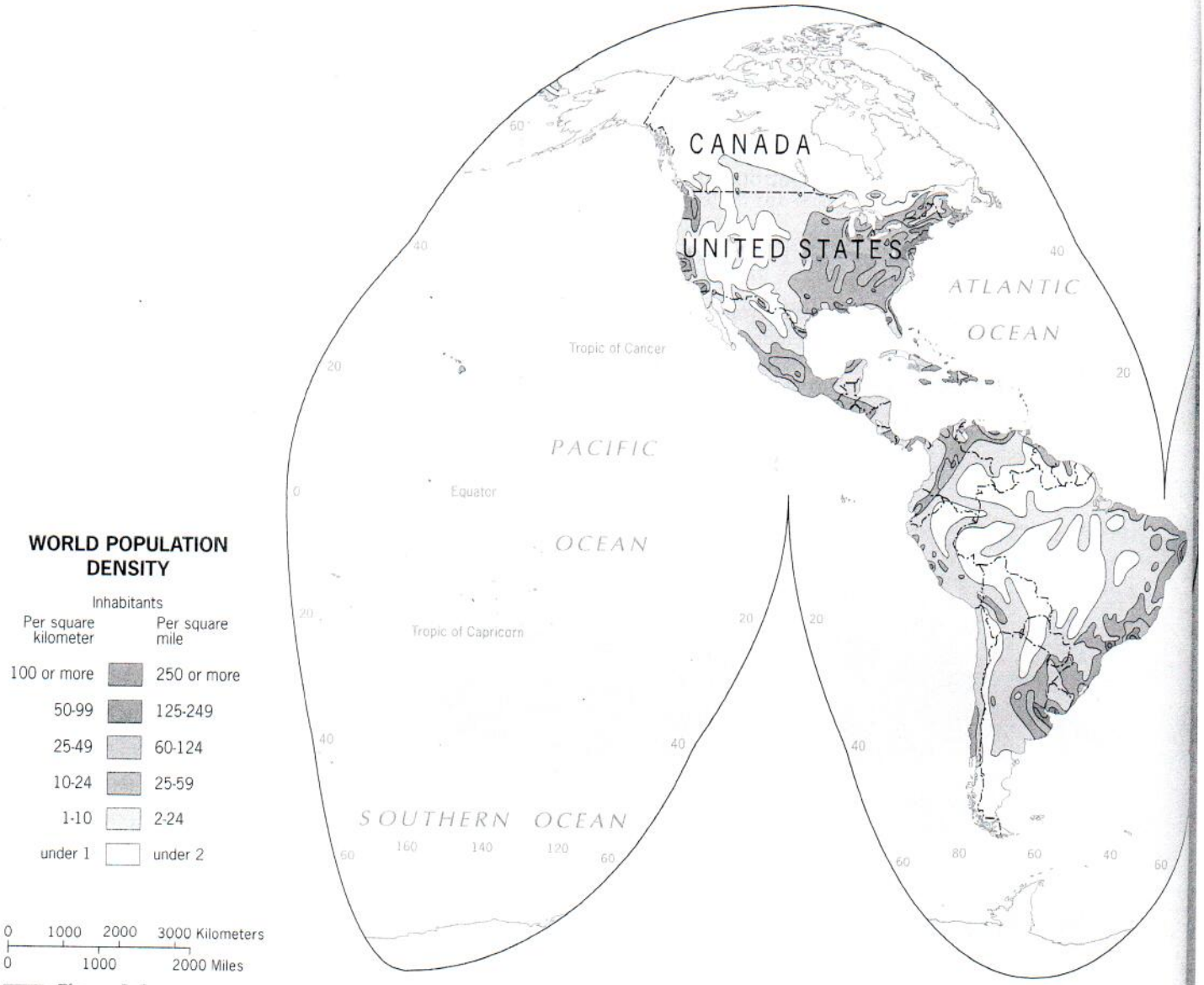


Figure 2.6
World Population Density. © H. J. de Blij, A. B. Murphy, E. H. Fouberg, and John Wiley & Sons, Inc.

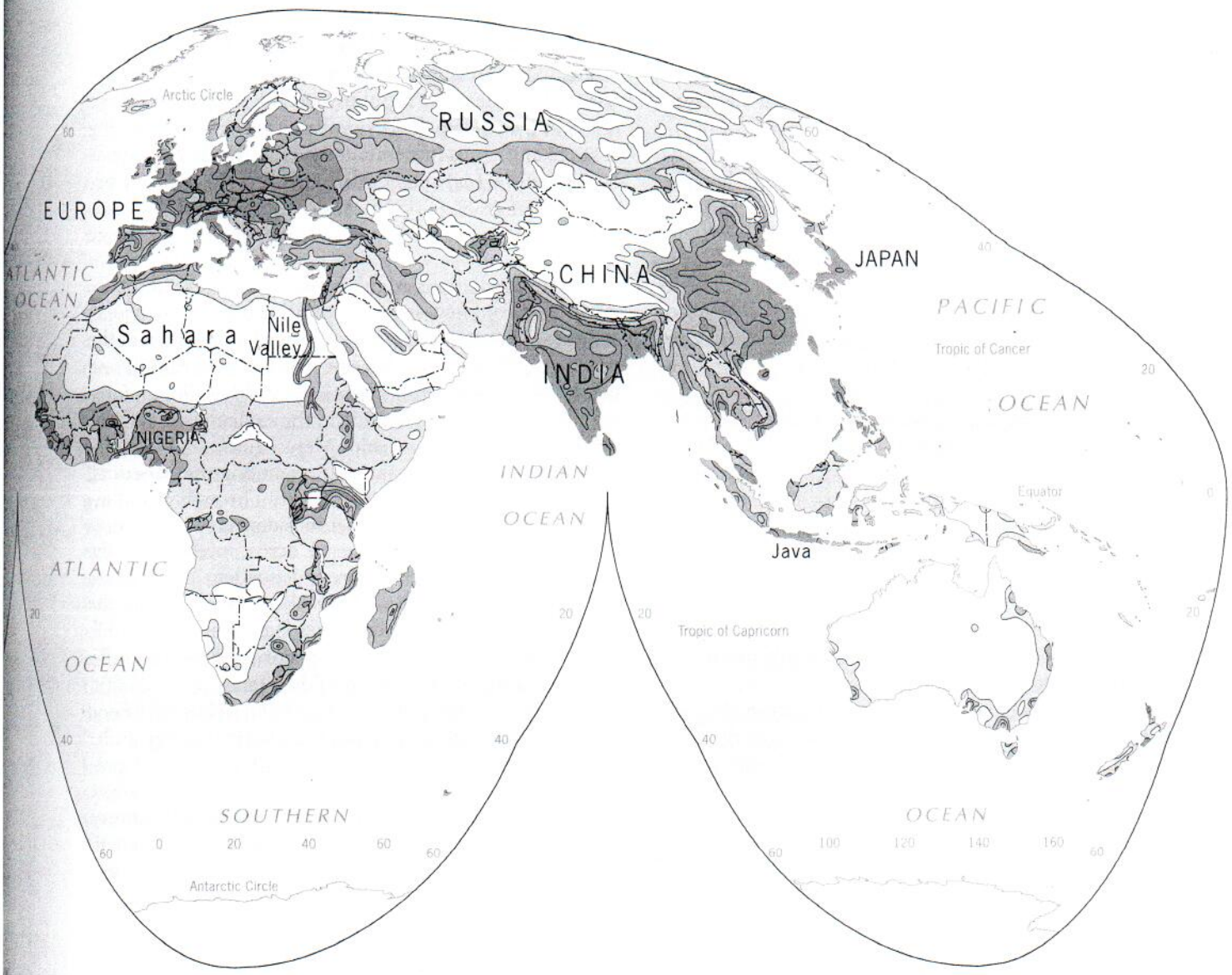
Poland and its neighbors to the south. A much greater correspondence exists between coastal and river lowlands and high population density in Asia than in Europe generally.

Another contrast can be seen in the number of Europeans who live in cities and towns. The European population cluster includes numerous cities and towns, many of which developed as a result of the Industrial Revolution. In Germany, 88 percent of the people live in urban places; in the United Kingdom, 89 percent; and in France, 74 percent. With so many people concentrated in the cities, the rural countryside is more open and sparsely populated than in East and South Asia (where only about 30 percent of the people reside in cities and towns).

The three major population concentrations we have discussed—East Asia, South Asia, and Europe—account for over 4 billion of the total world population of approximately 6.4 billion people. Nowhere else on the globe is there a population cluster even half as great as any of these. The populations of South America, Africa, and Australia combined barely exceed the population of India alone.

North America

The population cluster comprising the east-central United States and southeastern Canada is about one-



quarter the size of the smallest of the Eurasian concentrations. As Figure 2.5 shows, the North American region does not have as large a contiguous high-density zone.

The major focus of the North America cluster lies in the urban complex along the eastern seaboard from Boston to Washington, D.C., including New York, Philadelphia, and Baltimore. Urban geographers use the term **megalopolis** to refer to such huge urban agglomerations, and some predict it is only a matter of time before these agglomerations coalesce into an enormous megacity. The cities of megalopolis account for more than 20 percent of the U.S. population.

Reliability of Population Data

When the United States planned and conducted its 2000 population **census**, various groups protested the practice of trying to count every single person in the country. Rather, many advocates of homeless, minorities, and others insisted the census practices resulted in a serious undercount of these disadvantaged populations. Much federal government funding depends on population data. If the population of a disadvantaged group is undercounted, it translates into a loss of dollars for city governments that rely on federal government funding to pay for social services to disadvantaged groups. Thus, advocates are concerned the people

already in disadvantaged groups suffer more so under census undercounts. Being undercounted also translates into less government representation, for the number of congressional seats allotted to each state is based on the census counts.

Advocacy groups urged the census to sample the population and derive population statistics from the samples. They argued this would more accurately represent the true number of people in the United States. The United States Census Bureau continued to conduct its census as it always has, trying to count each individual in its borders. Despite all of the technology and people-power employed, some estimates claim the 2000 census undercounted the U.S. population by over 3.3 million people.

If a prosperous country such as the United States has problems conducting an accurate census, imagine the difficulties that must be overcome in less well-off countries. The cost, organization, and reporting of a census go beyond what many countries can afford or handle.

Several agencies collect data on world population. The United Nations records official statistics that national governments assemble and report. The World Bank and the Population Reference Bureau also gather and generate data and report on the population of the world and of individual countries.

If you compare the population data reported by each of these sources, you will find inconsistencies in the data. Data on population, growth rates, food availability, health conditions, and incomes are often informed estimates rather than actual counts.

THINKING GEOGRAPHICALLY

As we discussed in the field note at the beginning of this chapter, populations are falling in some parts of the world. How will Figure 2.5 look different 50 years from now? If you were updating this textbook in 50 years, where would the largest population clusters in the world be?

WHY DO POPULATIONS RISE OR FALL IN PARTICULAR PLACES?

In the late 1960s, alarms sounded throughout the world with the publication of Paul Ehrlich's *The Population Bomb*. Ehrlich and others warned that the world's population was increasing too quickly—and was outpacing our food production! We can trace alarms over the burgeoning world population back to 1798, when British economist Thomas Malthus published *An Essay on the Principles of Population*. In this work he admonished that the world's population was increasing faster than the food supplies needed to sustain it. His reasoning was that food supplies grew *linearly*, adding acreage and crops incrementally by year, whereas population grew *exponentially*, compounding on the year before. From 1803 to 1826, Malthus issued revised editions of his essay and responded vigorously to a barrage of criticism.

The predictions Malthus made assumed food production is confined spatially and linearly—what people can eat within a country depends on what is grown in the country. We now know his assumptions were false. Food production is not confined spatially. Malthus did not foresee how globalization would aid the exchange of agricultural goods across the world. Mercantilism, colonialism, and capitalism brought interaction among the Americas, Europe, Africa, Asia, and the Pacific. Through global interaction, new agricultural methods developed, and commodities and livestock diffused across oceans. In the 1700s, farmers in Ireland grew dependent on a South American crop that was well suited for its rocky soils, the potato. Today, wealthier countries lacking in arable land, such as Norway, can import the majority of its foodstuffs, circumventing the limitations of their lands.

Neither is food production confined linearly. Food production has grown exponentially as the acreage under cultivation expands, mechanization of agricultural production diffuses, improved strains of seed are developed, and more fertilizers are used. In the twenty-first century, bioengineering continues to bring new hybrids, genetically modified organisms, and countless herbicides and pesticides.

Nonetheless, Malthus's ideas continue to attract followers. Neo-Malthusians are scholars who continue to share Malthus's concerns (even if they do not agree with every detail of his argument) and continue to be alarmed at the continuing rise in the world's population. Neo-Malthusians point out that human suffering is now occurring on a scale unimagined even by Malthus. Although many demographers now predict the world population will stabilize later in the twenty-first century, neo-Malthusians argue that overpopulation must be addressed now.

Population Growth at World, Regional, National, and Local Scales

Analysis of population growth and change requires attention to scale. In this section, we examine population growth at different scales, but we must be mindful that what happens at one scale can be affected by what is

happening at other scales and in other places at the same time.

Keeping in mind that population change in one place can be affected rapidly by what is going on in a neighboring country or at the regional scale, we can and do study population change within the confined territory of a country (or other administrative unit, such as a province or city). To calculate the natural increase in a country's population, simply subtract deaths from births. Calculating the natural increase misses two other key components in a country's population: immigration, which along with births adds to the total population, and emigration (outmigration), which along with deaths, subtracts from the total population. Using these four components, we can calculate demographic change within a territory.

When we mapped population growth in Figure 2.7, we did not take into account emigration and immigration. Other maps and tables of population growth you see may take into account emigration and immigration. Statistics for each population datum can be calculated globally, by region, by country, or even for smaller locales. When studying population data across scales and across the world, we must constantly remind ourselves exactly what is being calculated and for where. Otherwise, many of the statistics we read will seemingly be contradictory.

For example, we began this chapter discussing the low and declining TFRs in a number of countries in the world. How can the worldwide population continue to increase when so many countries are experiencing low TFRs and population decline? Despite declining population growth rates and even negative growth rates (growth rates below 0.0) in a number of the world's countries, the global population continues to rise. The worldwide TFR was 2.8 in 2004, above the replacement level of 2.1. The Population Reference Bureau estimates global population rising to over 7.9 billion by 2025. The low TFRs and low population growth rates enumerated in this chapter are dwarfed by continued additions to the population in countries where growth rates are still relatively high, such as India, Indonesia, Bangladesh, Pakistan, and Nigeria.

One way to easily grasp the growth rate in world population is to compare a population's rate of growth to its **doubling time**. Every rate of growth has a doubling time; for example, if you invest $100 at 10 percent, compounded annually (exponentially), it would take about seven years to double to $200, and then another seven years to become $400, and then another seven years to become $800. When the growth rate is 10 percent, therefore, the doubling time is around seven years.

Two thousand years ago, the world's population was an estimated 250 million. More than 16 centuries passed before this total had doubled to 500 million, the estimated population in 1650. Just 170 years later, in 1820 (when Malthus was still writing), the population had doubled again, to 1 billion (Fig. 2.8). And barely more than a century after this, in 1930, it reached 2 billion. The doubling time was down to 100 years and dropping fast; the **population explosion** was in full gear. Only 45 years elapsed during the next doubling, to 4 billion (1975). During the mid-1980s, when the rate declined to 1.8 percent, the doubling slowed to 39 years. Today, world population is doubling in 51 years, and the continuing slowdown in the estimated doubling rate is one of the bright spots in the problematic demographic picture.

For demographers and population geographers who study global population growth today, the concept of doubling time is losing much of its punch. With populations falling in many places, fears of global population doubling quickly are definitely subsiding. Many indicators, such as the slowing of the doubling time, suggest that the worst may be over, that the explosive population growth of the twentieth century will be followed by a marked and accelerating slowdown during the twenty-first century. The global growth rate is now down to 1.4 percent, perhaps slightly lower. But today the world's population is about 6.4 billion, yielding an increase in world population that still exceeds 80 million annually. Although this does reflect improvement over the 90 million annual increase the world experienced in the late 1980s, the population growth rate of the globe will have to come down well below 1.0 percent to significantly slow down global population growth.

Population Growth at the Regional and National Scales

The world map of population growth rates (Fig. 2.7), displayed by country, confirms the wide range of natural increases in different geographic regions. These variations have existed as long as records have been kept: countries and regions go through stages of expansion and decline at varying times. In the mid-twentieth century, the population of the former Soviet Union was growing vigorously. Thirty years ago, India's population was growing at nearly 3.0 percent, more than most African countries; then India's growth rate fell below that of Subsaharan Africa. Today, Africa's rate of natural increase still is higher than India's (2.5 percent to 1.7 percent), but now Subsaharan Africa faces the impact of the AIDS epidemic, which is killing millions, orphaning children, reducing life expectancies, and curtailing growth rates.

The map also reveals the continuing high growth rates in Muslim countries of North Africa and Southwest Asia. Saudi Arabia has one of the highest growth rates in the world, but some smaller countries in this region are

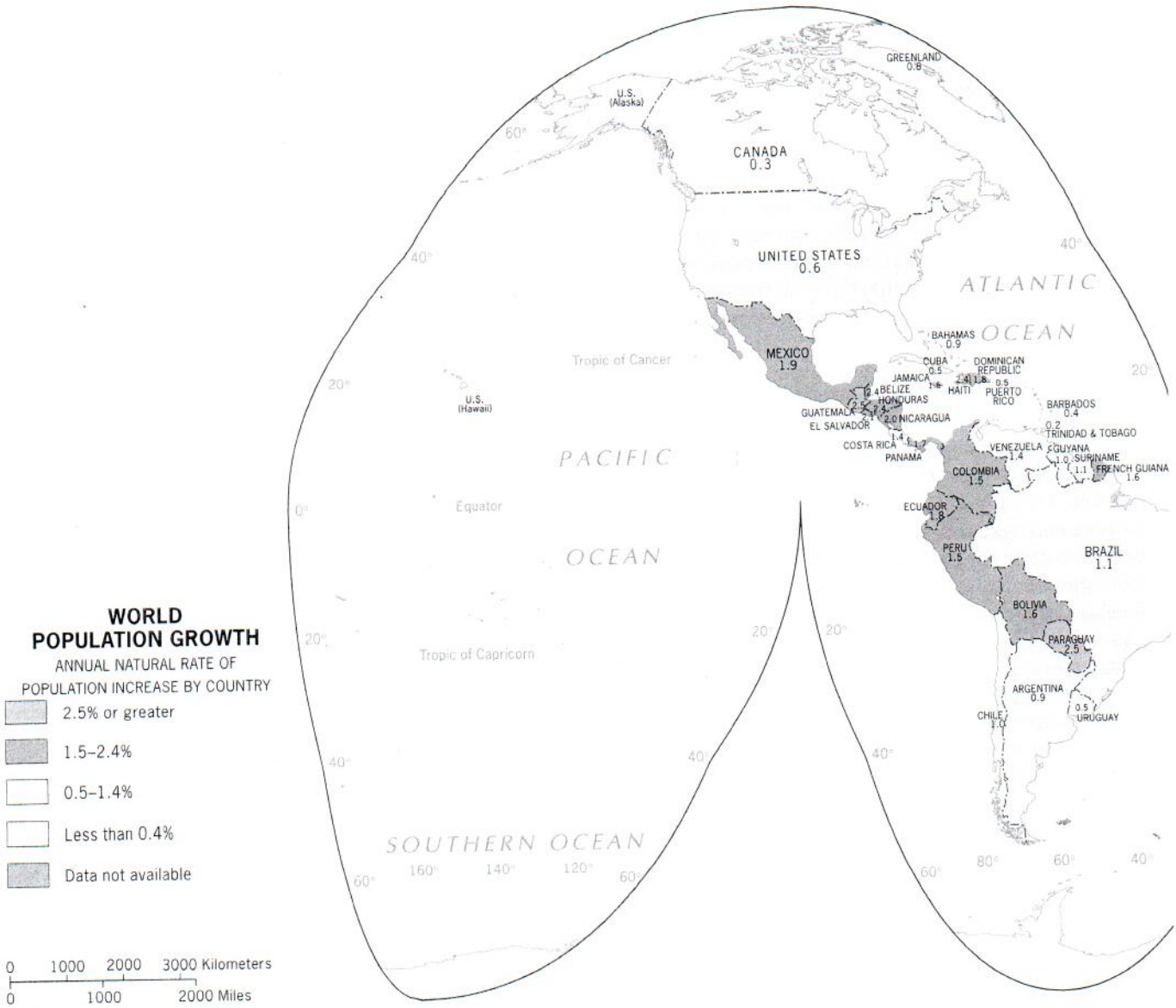
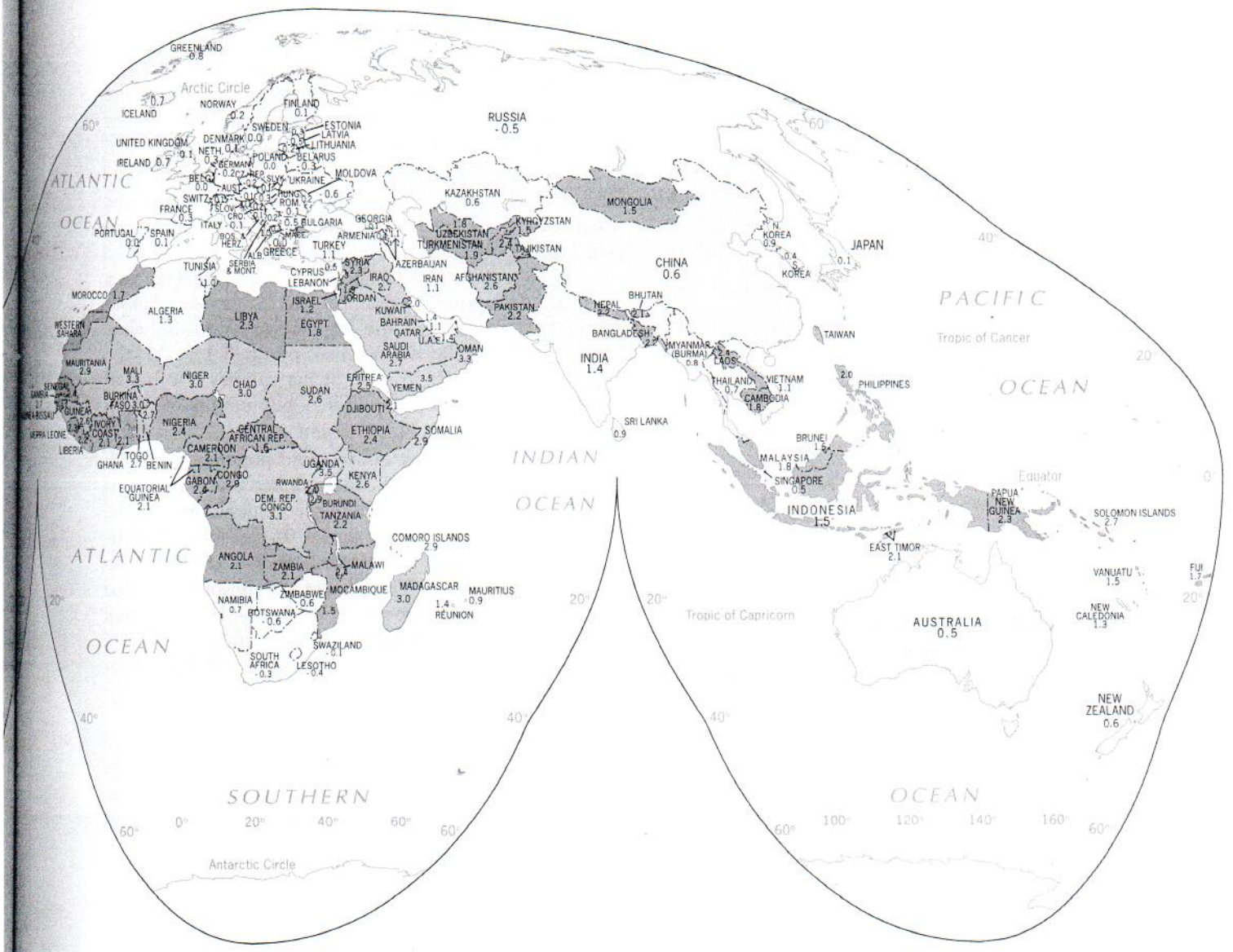


Figure 2.7
World Population Growth. Annual natural rate of population increase by country. *Data from*: United States Census Bureau, International Data Base, 2005.

increasing even faster. For some time during the second half of the twentieth century, countries in this region saw their growth rates increase even as those in most of the rest of the world were declining. But more recently several of the fast-growing populations, for example, those of Iran and Morocco, have shown significant declines. Demographers point to the correlation between high growth rates and the low standing of women: where cultural traditions restrict educational and professional opportunities for women, and men dominate as a matter of custom, rates of natural increase tend to be high.

South Asia is the most important geographic region in the population growth rate picture. The region includes the country that appears destined to overtake China as the world's most populous: India. Only one country in this region has a growth rate lower than the world average: Sri Lanka. But Sri Lanka's total population is only 20 million, whereas the fast-growing countries, Pakistan and Bangladesh, have a combined population approaching 300 million. India, as the map shows, is still growing well above the world average. The situation in East Asia, the world's most populous region, is different. China's official rate of natural growth has fallen well



below 1.0 percent (0.6 in 2004), Japan's population will begin to decline between now and 2007. Southeast Asia's natural growth rates remain higher, but this region's total population is much lower than either East or South Asia; key countries, such as Indonesia, Thailand, and Vietnam, have declining growth rates.

South America is experiencing significant reductions in natural population growth rates, where those rates were alarmingly high just a generation ago. The region as a whole is still growing at 1.5 percent, but Brazil's population, for example, has declined from 2.9 percent in the mid-1960s to 1.3 percent today. And the populations of the Southern Cone (Argentina, Chile, and Uruguay) are growing at rates well below the world average.

As Figure 2.7 shows, the slowest growing countries—including those with declining rates of natural population increase—lie in the economically wealthier areas of the world extending from the United States and Canada across Europe, Russia, and Japan. In the Southern Hemisphere, Australia, New Zealand, and Uruguay are in this category. As we have noted, not all countries with low or negative population growth are economically well off. Russia's population is declining because of social dislocation in the wake of the collapse of the Soviet Union: deteriorating

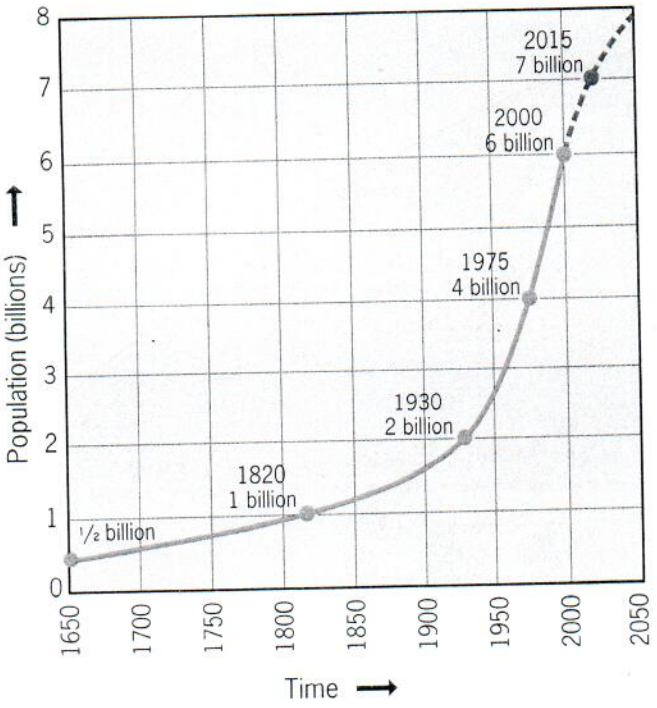


Figure 2.8
Population Growth, 1650 to 2050. The dashed line indicates one estimate of global population growth for the next 50 years. *Data from*: United States Census Bureau, International Data Base, 2004.

health conditions, high rates of alcoholism and drug use, and economic problems combine to shorten life expectancies (especially among males) and lower birth rates. Similar problems afflict Ukraine and Kazakhstan, two of Russia's neighbors, which also show slow or negative growth.

No single factor can explain the variations shown on Figure 2.7. Economic prosperity as well as social dislocation reduce natural population growth rates. Economic well-being, associated with urbanization, higher levels of education, later marriage, family planning, and other factors, lowers population growth. In the table in Appendix B, compare the indices for natural population increase and the percentage of the population that is urbanized; in general, the higher the population's level of urbanization, the lower its natural increase. Cultural traditions also influence rates of population growth: religion, for example, has a powerful impact on family planning and thus on growth rates, not only in Islamic countries but also in traditional Christian societies (note the Roman Catholic Philippines' growth rate) and in Hindu-dominated communities.

Population Growth at the Local Scale

The information provided in Figure 2.7 is based on countrywide statistics. Significant demographic variations also occur *within* countries. In India, for example, some States record population growth rates far above the national average; these States lie mostly in the east and northeast-west of the country (Fig. 2.9). But other States, in the west and southwest region, are growing much more slowly. India is a federation of 28 States and 7 so-called Union Territories, and the individual States differ greatly both culturally and politically. As in any federation, the will of the federal government cannot be forcibly imposed on the States.

After becoming independent in 1947, India began a population planning program in the 1950s, long before the real dimensions of the population explosion were known. In the 1960s, when census numbers revealed the extreme growth rates in parts of the country, the Indian government instituted a national population planning program, encouraging States to join.

Despite the federal effort, rapid population growth continued, especially in the eastern States. Social problems arose in some of the States where governments pursued the campaign vigorously. During the 1970s, the Indian government began a policy of forced sterilization of any man with three or more children. The State of Maharashtra sterilized 3.7 million people before public opposition led to rioting, and the government abandoned the program (Fig. 2.10). Other States also engaged in compulsory sterilization programs, with heavy social and political costs—eventually, 22.5 million people were sterilized.

The horrors of the forced sterilization program of the 1970s are haunting India again. In 2004, three districts in the State of Uttar Pradesh (India's most populous State with over 170 million people) instituted a policy of exchanging gun licenses for sterilization. The policy allows for a shotgun license in exchange for the sterilization of two people and a revolver license in exchange for the sterilization of five people. Abuse began almost immediately, with wealthy landowners sterilizing their laborers in exchange for gun licenses. Before the "guns for sterilization" policy, districts in Uttar Pradesh encouraged sterilization by providing access to housing and extra food for people who agreed to be sterilized.

Today, most Indian State governments are using advertising and persuasion—not guns for sterilization—to encourage families to have fewer children. Posters urging people to have small families are everywhere, and the government supports a network of family planning clinics even in the remotest villages. The southern States continue to report the lowest growth rates, correlating with higher wealth and education levels in these States. The eastern and northern States, the poorer regions of India, continue to report the highest growth rates.

Our world map of growth rates is a global overview, a mere introduction to the complexities of the geography of population. The example of India demonstrates that what we see at the scale of a world map does not give us the

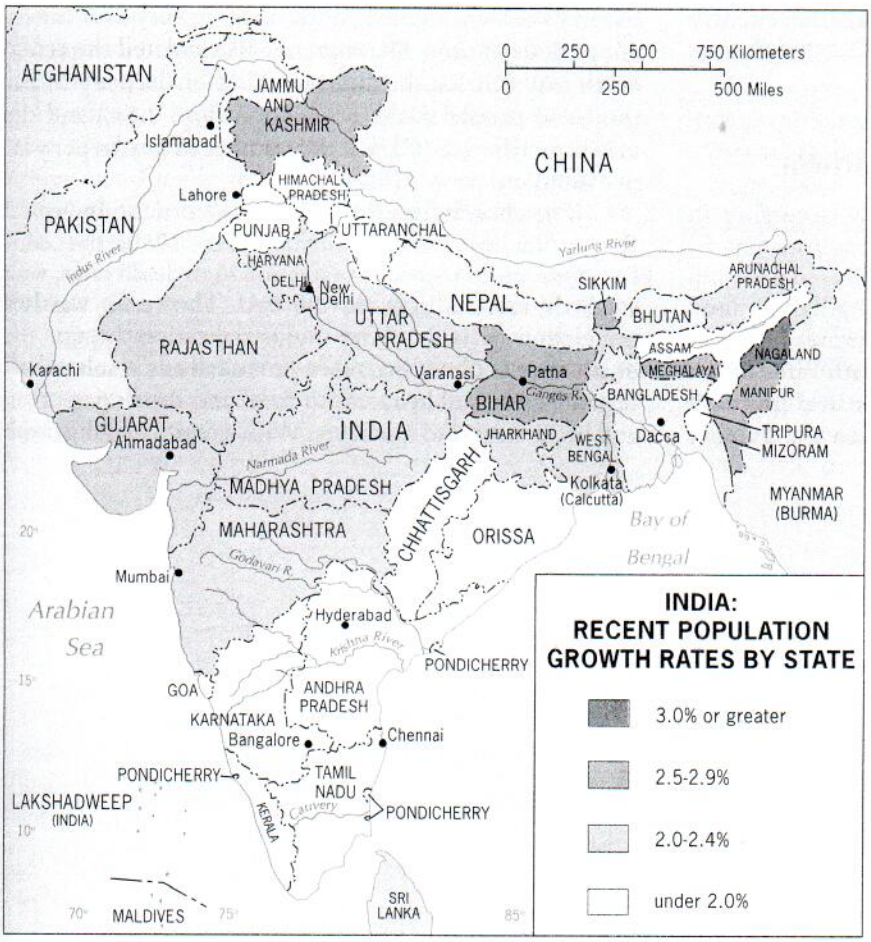


Figure 2.9
Recent Population Growth Rates in India. *Data from*: India Census Bureau, 2001.

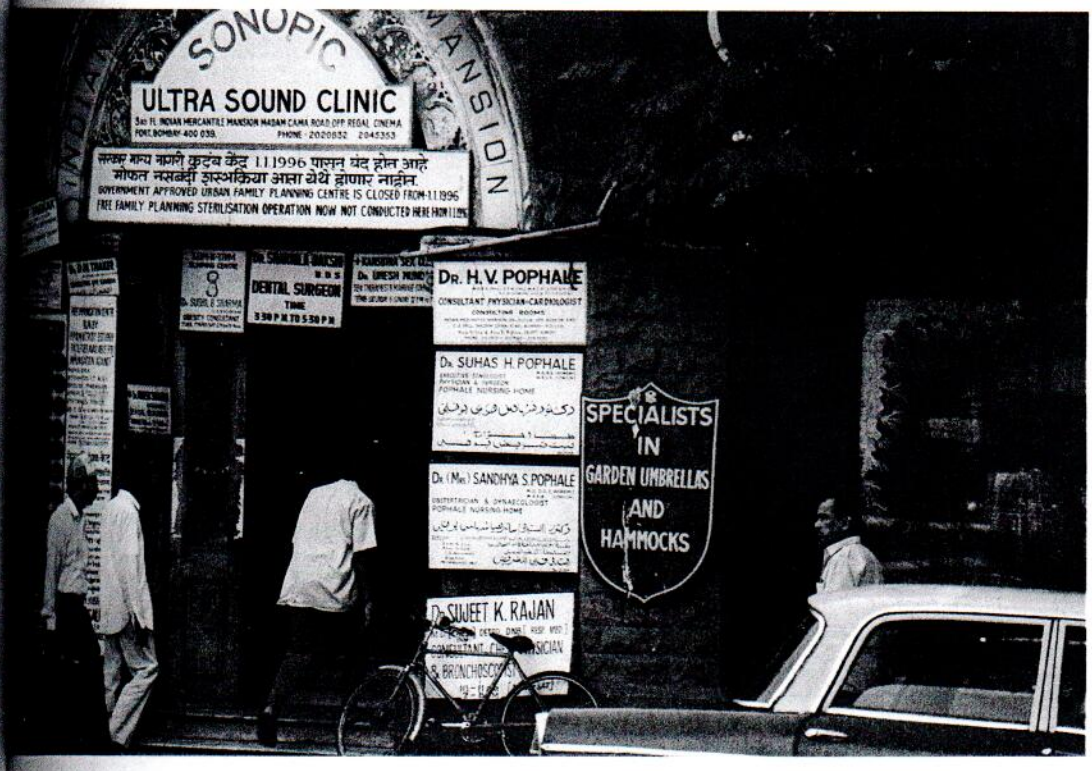


Figure 2.10
Maharashtra, India. Above the entrance to a suite of medical offices is a sign announcing that the "free family planning sterilization operation" closed in 1996.
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complete story of what is happening within each country or region of the world.

The Demographic Transition in Great Britain

The high population growth rates now occurring in many poorer countries are not necessarily permanent. In Europe, for example, population growth changed several times in the last three centuries. Demographers used data on baptisms and funerals from churches in Great Britain to study changes in birth and death rates of the population. They expected the rate of **natural increase** of the population—the difference between the number of births and the number of deaths—to vary over different periods of time. Demographers calculated the **crude birth rate (CBR)**, the number of live births per year per thousand people in the population (Fig. 2.11), and the **crude death rate (CDR)**, the number of deaths per year per thousand people (Fig. 2.12).

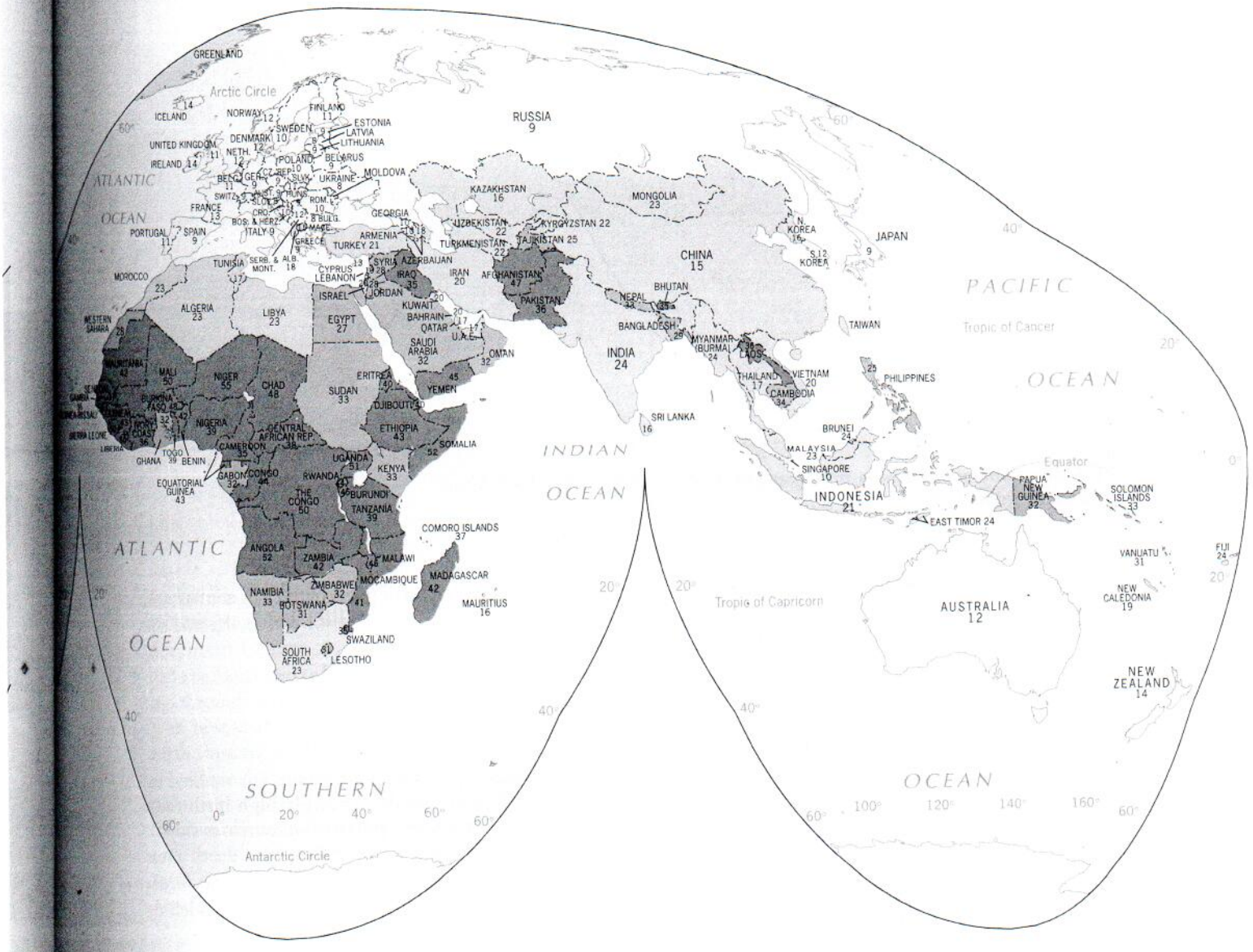
The church data revealed that before the Industrial Revolution began in Great Britain in the 1750s, the country experienced high birth rates and high death rates, with small differences between the two. The result was low population growth. After industrialization began, the death rates in Great Britain began to fall as a result of better and more stable access to food and developments in and better access to medicine. With a rapidly falling death

Figure 2.11
Crude Birth Rate: Number of Births in a year per 1,000 people. *Data from*: United Nations Population Division, 2003.

rate and a birth rate that remained high, Britain's population explosion took place. From the late 1800s through two world wars in the 1900s, death rates continued to fall and birth rates began to fall, but stayed higher than death rates, resulting in continued population growth but at a slower rate. Finally, in recent history, both the birth rate and death rate in Great Britain sustained low levels, resulting in slow or stabilized population growth.

Great Britain provides the model for four stages in a demographic cycle. Demographers who have analyzed the population records of numerous countries have found the model still works well today, although the causes of movement from one stage to the next are quite different than in British times. Demographers call the sequence of stages in population growth the **demographic transition** model (Fig. 2.13) The four stages are:

1. *Low-growth stage*—high birth rate and high death rate lead to a population that varies over time, with little long-term population growth.
2. *High-growth stage*—high birth rate and declining death rate lead to sustained and significant population increase.
3. *Moderate-growth stage*—declining birth rate combined with already-low death rate lead to continuing population growth.
4. *Low-growth or stationary stage*—low birth rate and low death rate lead to a very low rate of growth.



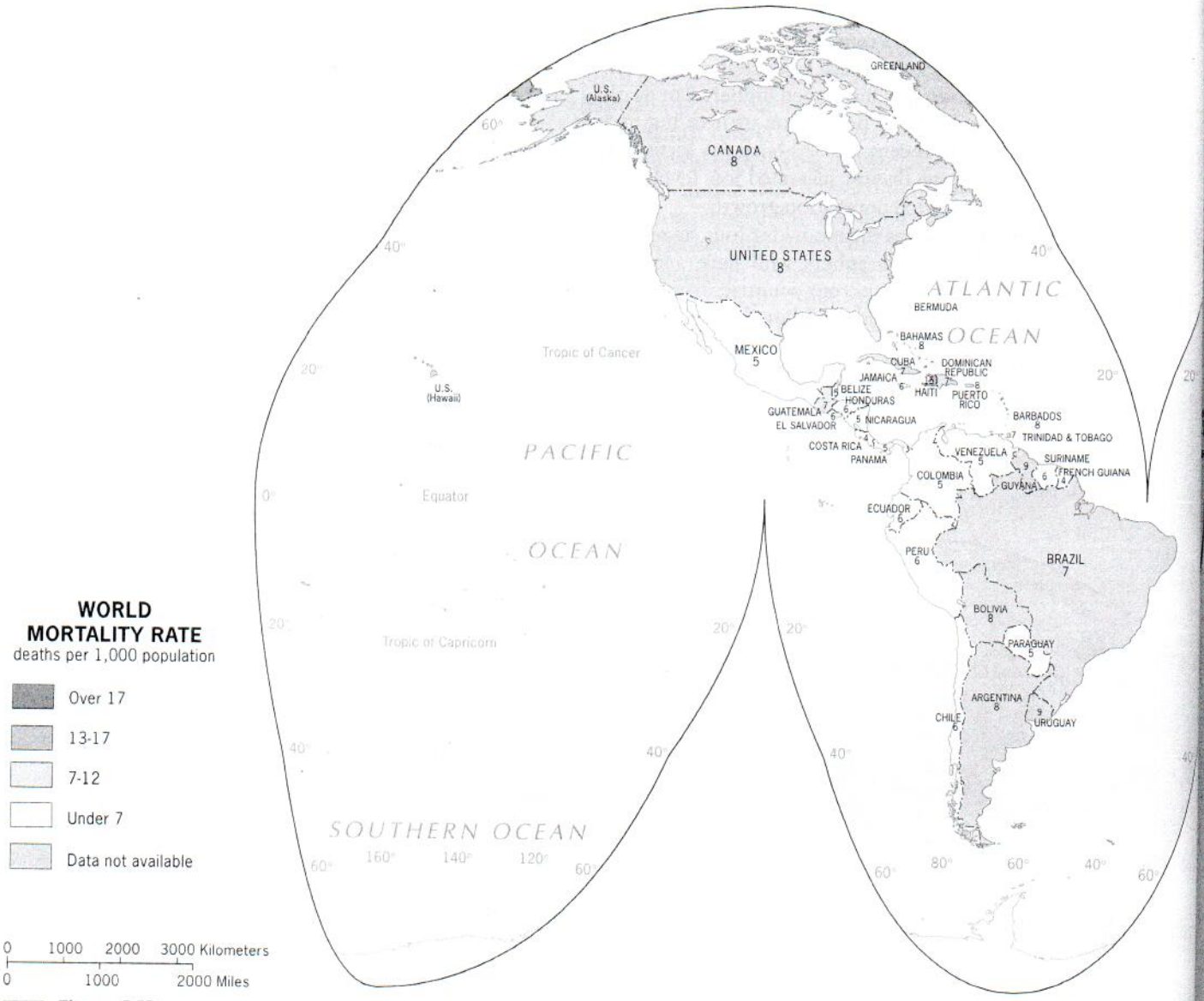


Figure 2.12
Crude Death Rate: Number of Deaths in a Year per 1,000 People. *Data from*: United Nations Population Division, 2003.

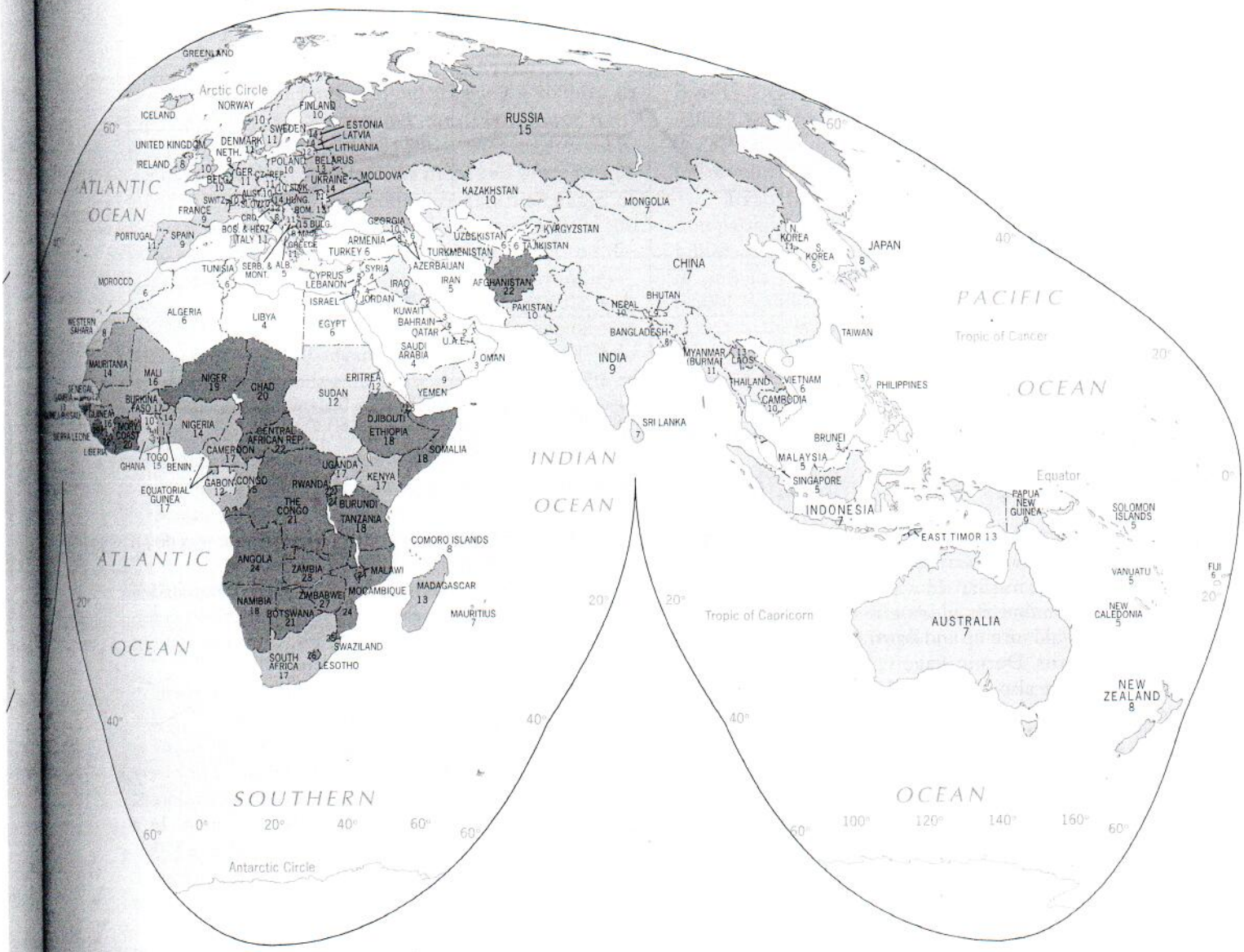
The *transition* in the demographic transition occurs in stages 2 and 3, when death rates decline and then birth rates decline. When the death rate and birth rate fall, the country transitions from a high growth rate to a low or sustained growth rate.

The Demographic Transition

Why countries move from one stage of the demographic transition to another has varied over time. No one knows exactly how wide the range of population growth rates was prior to written records. We do know that populations rose and fell, varying according to changes in climate and weather, famine and pestilence, all of which affected the food supply.

Stage 1: Low Growth

The low population growth rate of stage 1 is marked by much human suffering. With incredibly high birth rates and equally high death rates, population increases slowly. In stage 1, epidemics and plagues keep the death rates high among all sectors of the population. For Great Britain and the rest of Europe, stage 1 was indelibly



marked by the bubonic plague. During the 1300s, the bubonic plague (the Black Death) hit Europe in waves beginning in Crimea on the Black Sea, diffusing through trade to Sicily and other Mediterranean islands, and moving through contagious diffusion and the travel of rats (who hosted the vector, the flea, that spread the plague) north from the Mediterranean.

Once the plague hit a region, it was likely to return within a few years time, creating another wave of human suffering. Estimates of plague deaths vary between one-quarter and one-half of the population, with the highest death rates recorded in the West (where trade among regions was the greatest) and the lowest in the East (where cooler climates and less connected populations delayed diffusion). Across Europe, many cities and towns were left with fewer than half of their inhabitants. Historians estimate the population of Great Britain fell from nearly 4 million when the plague began to just over 2 million when it ended.

Famines also limited population growth. A famine in Europe just prior to the plague likely facilitated the diffusion of the disease by weakening the people. Records of famines in India and China during the eighteenth and nineteenth centuries document millions of people perishing. At other times, destructive wars largely wiped out population gains. Charts of world population growth

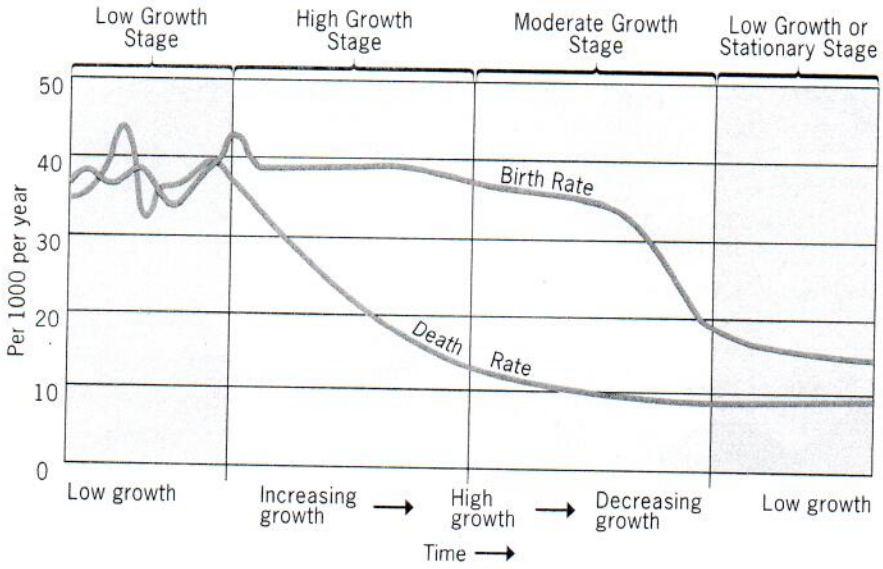


Figure 2.13
The Demographic Transition Model. Four stages of the demographic transition.
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show an increase in the world's population from 250 million people 2000 years ago to 500 million people in 1650 and 1 billion people in 1820. However, the lines connecting these points in time should not be steadily increasing. Rather, they should turn up and down frequently to reveal the ups and downs. During stage 1, birth rates are high, but death rates are also high, and the world often experiences many more deaths than live births.

Stage 2: High Growth

The 1700s mark the beginning of the Industrial Revolution. However, before the workers could move from farms to factories, a revolution in agriculture had to occur. The eighteenth century also marks the Second Agricultural Revolution, so named because the first occurred thousands of years earlier. During the Second Agricultural Revolution, farmers improved seed selection, practiced new methods of crop rotation, selectively bred livestock to increase production and quality, employed new technology such as the seed drill, expanded storage capacities, and consolidated landholdings for greater efficiencies. With more efficient farming methods the number of people needed in farming decreased and the food supply increased, thereby supporting a higher population overall.

In the 1800s, as the Industrial Revolution diffused through continental Europe, other advances also helped lower the death rates. Sanitation facilities made the towns and cities safer from epidemics, and modern medical practices diffused. Disease prevention through vaccination introduced a new era in public health. The combined improvements in food supply and medical practice resulted in a drastic reduction in death rates. Before 1750 death rates in Europe probably averaged 35 per 1000 (birth rates averaged under 40), but by 1850 the death rate was down to about 16 per 1000.

Birth rates fell at a slower rate, leading to population explosion. When European and North American countries moved into stage 2 in the 1800s, their populations took off, inflating worldwide population.

The increase in the rate of population growth in Europe spurred waves of migration. Millions of people left the squalid, crowded industrial cities (and farms as well) to emigrate to other parts of the world. They were not the first to make this journey. Adventurers, explorers, merchants, and colonists had gone before them. In a major wave of colonization from 1500 through the 1700s, European migrants decimated native populations through conquest, slavery, and the introduction of diseases against which the local people had no natural immunity.

When a second wave of European colonization began in Africa and Asia during the late 1800s, the Europeans brought with them their newfound methods of sanitation and medical techniques, and these had the opposite effect. By the mid-1900s, declining death rates in Africa, India, and South America brought those regions into stage 2, inflating their populations and burgeoning the world population. At this point, new alarms and cautions of worldwide overpopulation rang.

Stage 3: Moderate Growth

Although the global alarms continued to ring, the alarms subsided for populations in Europe and North America when countries in these regions entered stage 3 of the demographic transition in the first half of the 1900s. Stage 3 is marked by continuing, but slower, decline in death rates coupled with a significant decline in birth rates. The result is continued growth in the population but at a much

slower rate. In the second half of the 1900s, many countries in Latin America and Asia entered stage 3, which has helped slow the global population growth rate.

Why do birth rates decline, allowing a country to move into stage 3? Throughout the 1900s, lower birth rates arrived first in countries with greater urbanization, wealth, and medical advances. As more and more people moved to cities, both the economics and the culture of large families changed. Instead of lending a hand on the family farm, children in urban areas were a drain on the family finances. At the same time, new opportunities—especially for women—were often not compatible with large families. Hence, women often delayed marriage and childbearing. Medical advances lowered infant and child mortality rates, lessening the sense that multiple children were necessary to sustain a family. In recent history, the diffusion of contraceptives, the accessibility to abortions, and woman's conscious decision to have fewer children or to start having children at a later age all lower birth rates within a country.

Stage 4: Low Growth or Stationary Stage

The countries experiencing exceptionally low TFRs are in the fourth stage of the demographic transition. Having achieved low (if not too low) birth rates along with low death rates puts the countries in a position of low to no population growth. Birth rates are lowest in the countries where women are the most educated and most involved in the labor force.

Future Population Growth

It may be unwise to assume that the demographic cycles of all countries will follow the sequence that occurred in industrializing Europe or to believe that the still-significant population growth currently taking place in Bangladesh, Mexico, and numerous other countries will simply subside. Nonetheless, many agencies monitoring global population suggest most (if not all) countries' populations will stop growing at some time during the twenty-first century, reaching a so-called **stationary population level (SPL)**. This would mean, of course, that the world's population would stabilize and that the major problems to be faced would involve the aged rather than the young. In 2004, the United Nations predicted that world population would stabilize at 9 billion in 300 years.

Such predictions require frequent revision, however, and anticipated dates for population stabilization are often moved back. Only a few years ago, the United Nations predicted world population would stabilize at 10 billion in 200 years. The United Nations changed its predictions based on lower fertility rates in many countries. All agencies reporting population predictions have to revise their predictions periodically. In the late 1980s, for example, the World Bank predicted that the United States would reach SPL in 2035 with 276 million inhabitants. Brazil's population would stabilize at 353 million in 2070, Mexico's at 254 million in 2075, and China's at 1.4 billion in 2090. India, destined to become the world's most populous country, would reach SPL at 1.6 billion in 2150.

Today these figures are unrealistic. China's population passed the 1.2 billion mark in 1994; India's reached 1 billion in 1998. If we were to project an optimistic decline in growth rates for both countries, China's population would "stabilize" at 1.7 billion in 2070 and India's at 2.0 billion in the same year. But population increase is a cyclical phenomenon, and overall declines mask lags and spurts (not to mention regional disparities).

THINKING GEOGRAPHICALLY

Examine Appendix B at the end of the book. Study the growth rate column. Which countries have the highest growth rates? Determine what stage of the demographic transition these countries are in, and hypothesize what may lead them to the next stage.

WHY DOES POPULATION COMPOSITION MATTER?

Maps showing the regional distribution and density of populations tell us about the number of people in countries or regions, but they cannot reveal two other aspects of those populations: the number of men and women and their ages. These aspects of population, the **population composition**, are important because a populous country where half the population is very young has quite different problems from a populous country where a large proportion of the population is elderly. When geographers study populations, therefore, they are concerned not only with spatial distribution and growth rates but also with population composition.

The composition is the structure of a population in terms of age, sex, and other properties such as marital status and education. Age and sex are key indicators of population composition, and demographers and geographers use **population pyramids** to represent these traits visually. The pyramid displays the percentages of each age group in the total population (normally five-year groups) by a horizontal bar whose length represents its share. Males in the group are to the left of the center line, females to the right.

A population pyramid can instantly convey the demographic situation in a country. In the poorer countries, where birth and death rates generally remain high, the

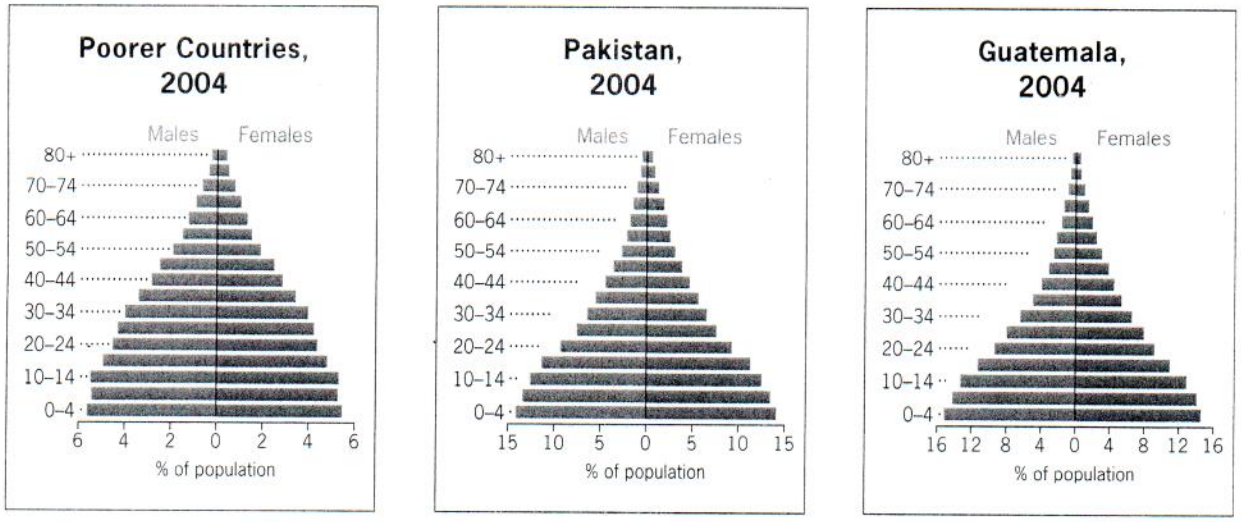


Figure 2.14
Age-Sex Population Pyramids for Countries with High Population Growth Rates. *Data from*: United States Census Bureau, International Database, 2004.

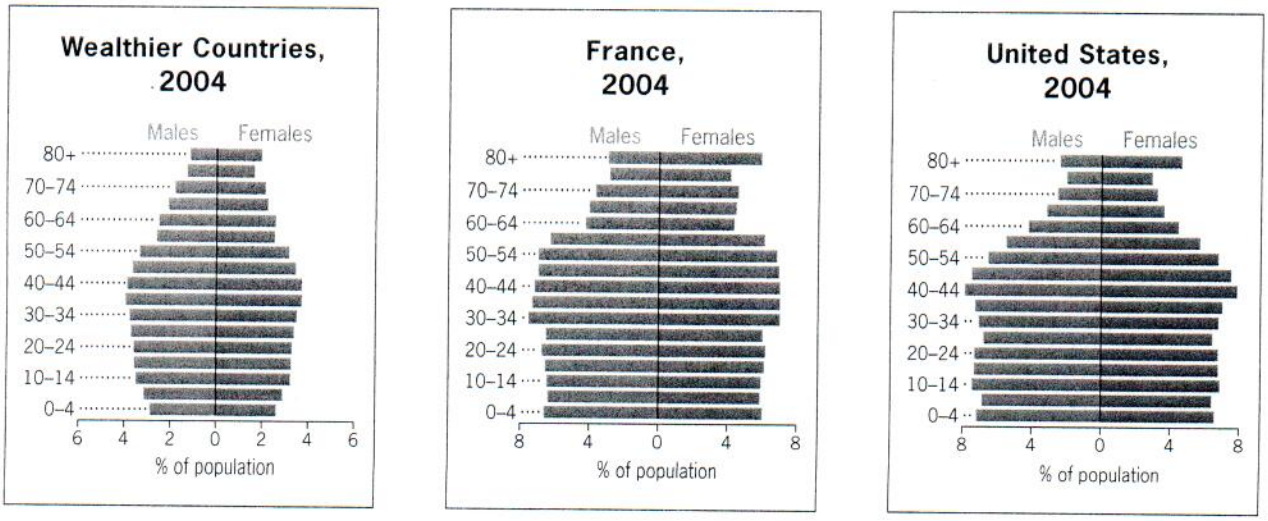
pyramid looks like an evergreen tree, with wide branches at the base and short ones near the top (Fig. 2.14). The youngest age groups have the largest share of the population; in the composite pyramid shown here, the three groups up to age 14 account for more than 30 percent of it. Older people, in the three highest age groups, represent only about 4 percent of the total. Slight variations of this pyramidal shape mark the population structure of such countries as Pakistan, Yemen, Guatemala, The Congo, and Laos. From age group 15 to 19 upward, each group is smaller than the one below it.

In countries with economic wealth, pyramid shapes change. Families become smaller, children fewer. A composite population pyramid for wealthier countries looks like a slightly lopsided vase, with the largest components of the population not at the bottom but in the middle. The middle-age bulge is moving upward, reflecting the aging of the population (Fig. 2.15) and the declining TFR. Countries with low TFR and high wealth, such as Italy, France, and Sweden, fit into this pyramid model.

Infant Mortality

Studying population pyramids helps us realize that knowing the condition of a country's population requires much

Figure 2.15
Age-Sex Population Pyramids for Countries with Low Population Growth Rates. *Data from*: United States Census Bureau, International Database, 2004.



more than simply knowing the total population or the growth rate. Other statistics can give us a glimpse of the welfare of the country's people, across regions, ethnicities, or social classes.

One measure of the condition of a country's population is the **infant mortality rate (IMR)**. Infant mortality is recorded as a baby's death during the first year following its birth (unlike child mortality, which records death between ages 1 and 5). Infant mortality is normally given as the number of cases per thousand, that is, per thousand live births.

Infant and child mortality reflect the overall health of a society. High infant mortality has a variety of causes, the physical health of the mother being a key factor. In societies where most women bear a large number of babies, the women also tend to be inadequately nourished, exhausted from overwork, suffering from disease, and poorly educated. Many infants die because they are improperly weaned. Demographers report that many children die because their parents do not know how to cope with the routine childhood problem of diarrhea. This, together with malnutrition, is the leading killer of children throughout the world. Poor sanitation is yet another threat to infants and children. Estimates are that more than one-fifth of the world's population lacks ready access to clean drinking water or hygienic human waste-disposal facilities.

The map showing the world distribution of infant mortality (Fig. 2.16) reveals high rates in many poorer countries. The map shows infant mortality patterns at five levels ranging from 100 or more per thousand (one death for every eight live births) to fewer than 15. Compare this map to that of overall crude death rate (CDR) in Figure 2.12, and the role of infant mortality in societies with high death rates is evident.

The lowest infant mortality rate among larger populations has long been reported by Japan, with 3.0 deaths per 1000 live births in a country of over 127 million people. Some less populated countries show even lower IMRs. Singapore has over 4 million people and an incredibly low IMR of 2.2, and Sweden's nearly 9 million people record an IMR of 2.8.

In 2004, 22 countries still reported an IMR of 100 or more, and several had rates of 125 or higher—that is, one death or more among every eight newborns. Sierra Leone had the highest IMR with 179.5, and Afghanistan recorded an IMR of 165. Dreadful as these figures are, they are a substantial improvement over the situation 20 or even 10 years ago (although they are not much improved since 1997). Globally, infant mortality has been declining, even in the poverty-stricken regions of the world. Still, the situation in many African and some Asian countries remains grim.

Maps based on national statistics conceal differences within a country. A statistic typically varies by region, ethnicity, social class, or other criteria. The IMR of South Africa is 48 per thousand, an average of all the people within the country's borders. The IMR for South African whites is near the European average; for black Africans it is nearer the African average; and for the Coloured and Asian population sectors it lies between these two figures. The reported average for South Africa does not tell ethnic and class differences within South Africa.

Child Mortality

Infants who survive their first year of life still do not have a long life expectancy in the poorer areas of the world. The **child mortality rate** (CMR), recording the deaths of children between the ages of 1 and 5, remains staggeringly high in much of Africa and Asia, notably in the protein-deficient tropical and subtropical zones. *Kwashiorkor* (also known as protein malnutrition), a malady resulting from a lack of protein early in life, afflicts millions of children; *marasmus*, a condition that results from inadequate protein and insufficient calories, causes the deaths of millions more. In some countries, more than one in five children still die between their first and fifth birthdays, a terrible record in this twenty-first century. In the more fortunate countries 1 in 100 is the norm.

Life Expectancy

Another indicator of a society's well-being lies in the **life expectancy** of its members at birth, the number of years, on average, someone may expect to remain alive. Figure 2.17 shows the average life expectancies of populations by country and thus does not take into account gender differences. Women outlive men by about four years in Europe and East Asia, three years in Subsaharan Africa, six years in North America, and seven years in South America. In Russia today, the difference may be as much as 14 years.

The map does reveal huge regional contrasts. At the start of the century, world average life expectancy was 68 for women and 64 for men. Not only are these levels exceeded in the wealthy countries of the Western world, but great progress has also been made in East Asia, where Japan's life expectancies are the highest in the world. With its low infant and child mortality rates and low fertility rates, Japan's life expectancy is predicted to rise to 106 by the year 2300. By contrast, tropical Subsaharan African countries have the lowest life expectancies. In Subsaharan Africa, the spread of AIDS over the past two decades has lowered life expectancies in some countries below 40, a level not seen for centuries.

Life expectancies can change in relatively short order. In the former Soviet Union, and especially in Russia, the life expectancies of males dropped quite precipitously following the collapse of communism, from 68

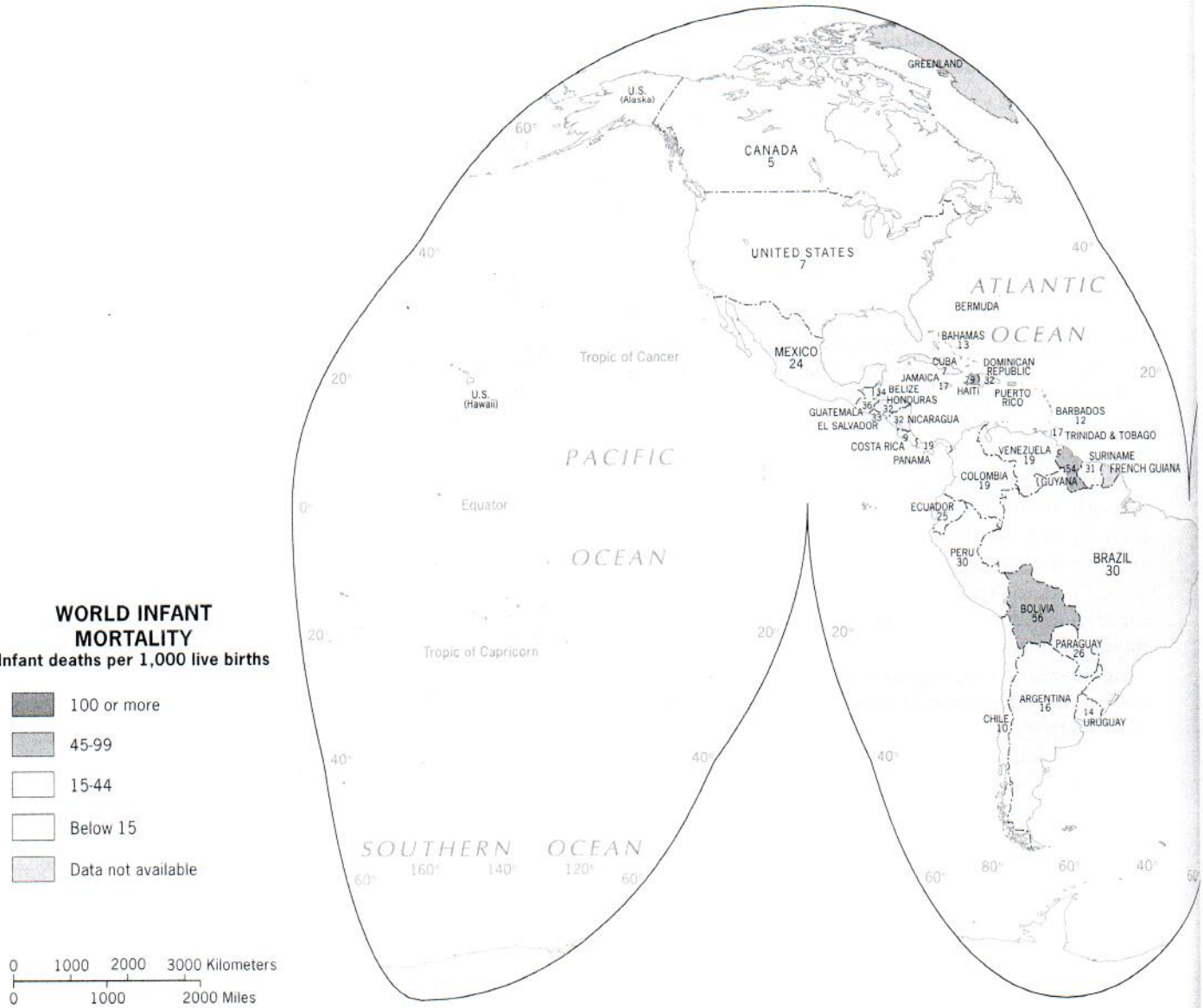


Figure 2.16
Infant Mortality Rate, 2002. *Data from*: United Nations Human Development Report, 2004.

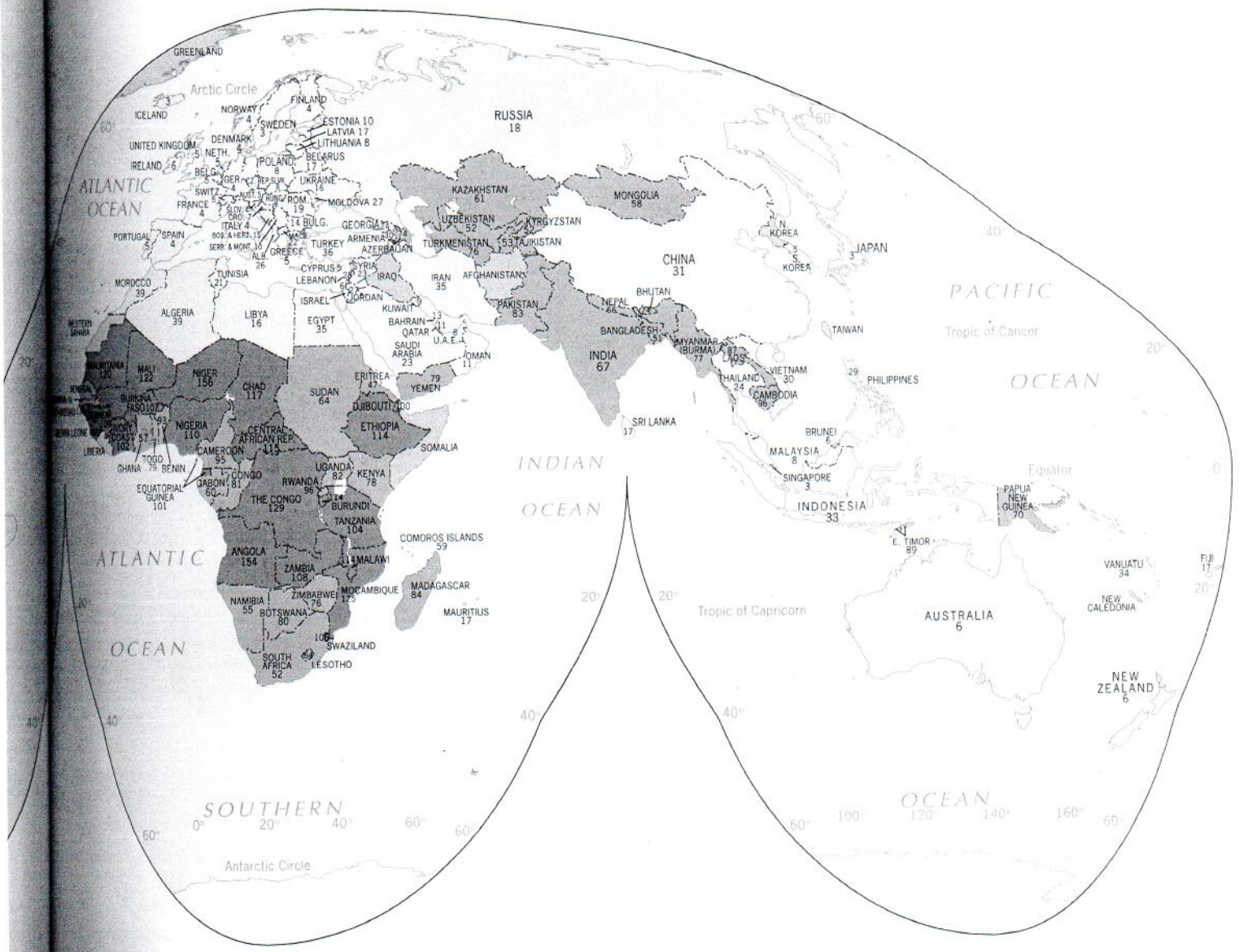
to 62 years. Today, Russia's life expectancy is only 58 for males; female life expectancy also declined, but only slightly, from 74 to 72.

Life expectancy figures do not mean everyone lives to a certain age. The figure is an average that takes account of the children who die young and the people who survive well beyond the average. Thus, the dramatically lower figures for the world's poorer countries primarily reflect high infant mortality. A person who has survived beyond childhood can survive well beyond the recorded life expectancy. The low life expectancy figures for the malnourished countries remind us again how hard hit children are in poorer parts of the world.

AIDS

Low life expectancies in some parts of the world are caused by the ravage of diseases such as AIDS. In the early 1980s, a new disease was identified in Africa: **AIDS** (Acquired Immune Deficiency Syndrome). Undoubtedly, AIDS had taken hold in Africa years earlier, perhaps decades earlier. But its rapid diffusion worldwide began in the 1980s, creating one of the greatest health catastrophes of the past century. Nowhere has its impact been greater than in Africa itself.

Medical geographers estimate that in 1980 about 200,000 people were infected with HIV (Human Immuno-



deficiency Virus, which causes AIDS), all of them Africans. By 2004, the number worldwide exceeded 37 million according to the United Nations AIDS Program, with nearly 67 percent (25 million) of all cases in Subsaharan Africa! In the first year of the twenty-first century, countries reported 5 million new cases, and 3 million patients died. Of those, 93 percent were Africans.

AIDS is a debilitating disease that weakens the body and reduces its capacity to combat other infections. It is spread through bodily contact that involves the exchange of bodily fluids such as blood or semen. Sexual activity and shared needles among drug users can transmit it but so can blood transfusions. Over a period of years, a person's immune system is impaired, weight loss and weakness set in, and other afflictions, such as cancer or pneumonia, may hasten an infected person's demise.

Over the past two decades, the AIDS pandemic has reached virtually all parts of the world, but its full dimensions are unknown. People infected by HIV do not immediately display visible symptoms of the disease; they can carry the virus for years without being aware of it, and during that period they can unwittingly transmit it to others. In its earliest stages a blood test is needed to confirm HIV's presence, but millions go untested. Add to this the social stigma many people attach to this malady, and it is evident that official statistics on AIDS lag far behind the real numbers.

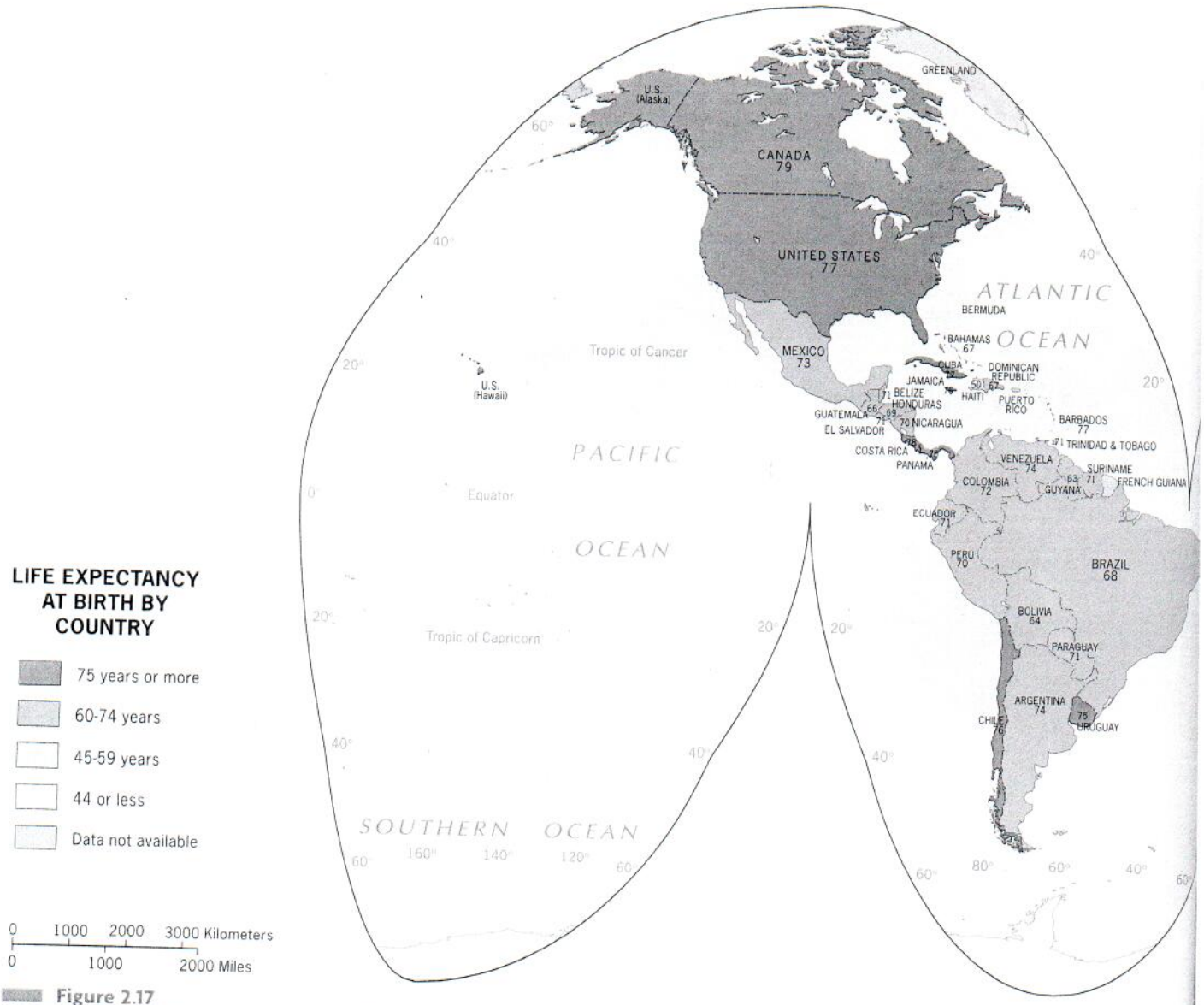
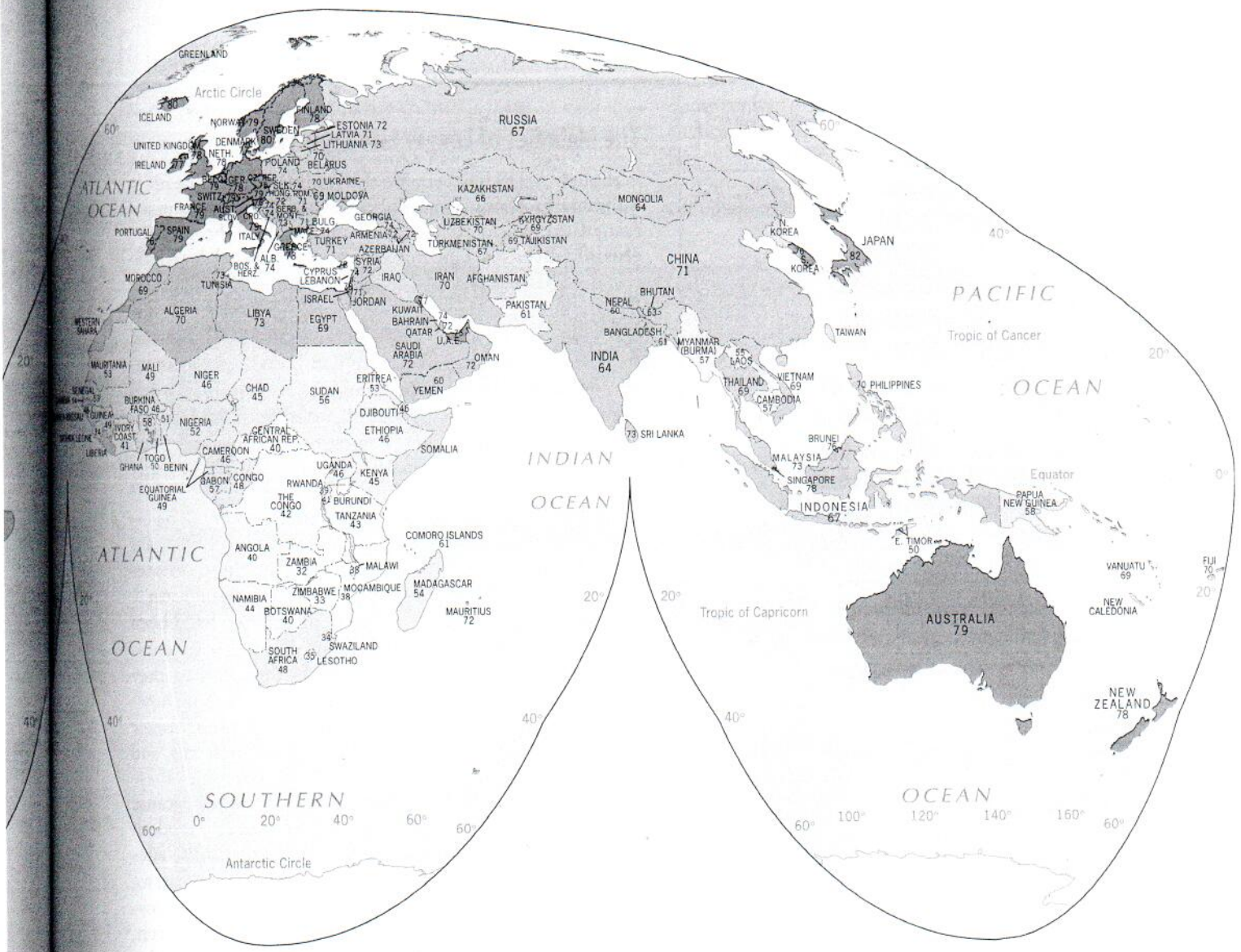


Figure 2.17
Life Expectancy at Birth in Years. *Data from*: United Nations Human Development Report, 2004.

That is true not only in Africa but in other parts of the world as well; both India and China, for example, long denied that AIDS presents a serious health threat to their populations. Now China is reporting more than 1 million infected, and the number in India may be even larger. Estimates of the number of cases in the United States surpass 1 million; in Middle and South America, nearly 2 million are infected. But after Africa, the worst-afflicted geographic realm is Southeast Asia, with as many as 6 million cases.

Nowhere is AIDS having the impact it has had on Subsaharan Africa, however. In 2002, more than 25 percent of people aged 15 to 49 were infected in Zimbabwe and Botswana, about 20 percent in Zambia, and about 15 percent in South Africa. These are the official data; medical geographers estimate that 20 to 25 percent of the entire population of several tropical African countries is infected. The United Nations AIDS program reports that more than 2 million people died of AIDS in Subsaharan Africa in 2003 alone. Geographer Peter Gould, in his book *The Slow Plague* (1993), calls Africa a "continent in catastrophe," and the demographic statistics confirm his viewpoint. Life expectancy in Botswana has declined from over 60 to under 40 (and is projected to fall below 30), in Swaziland it is 37, and in Zimbabwe, 39. In a continent already ravaged by other diseases, AIDS is the leading cause of death.



AIDS is reshaping the population structure of the countries hardest hit by the disease. Demographers look at the projected population pyramids for countries with high rates of infection and no longer see population pyramids—they see population chimneys. The shape of the projected population pyramid is altered to look more like a chimney than a pyramid, reflecting the major impact AIDS plays on the younger population in the country and its future generations (Fig. 2.18). The United States Census Bureau projects AIDS causing higher rates of death among young women than young men. In countries with population chimneys, men will take younger and younger brides, thus increasing the rate of AIDS in younger females.

Geographers are engaging in fieldwork to understand the human toll of AIDS locally and within families. Geographer Elsbeth Robson studied the impact of AIDS in hard-hit Zimbabwe. Robson found that global processes like the diffusion of AIDS and reductions in spending on health care (often mandated by structural adjustment programs) "shape young people's home lives and structure their wider experiences." In Subsaharan Africa, the number of children orphaned when parents die from AIDS is growing rapidly (Fig. 2.19). In 2004, UNICEF reported that in just two years, between 2001 and 2003, the number of global AIDS orphans (children who have lost a parent to AIDS) rose from 11.5 million to 15 million. Robson found

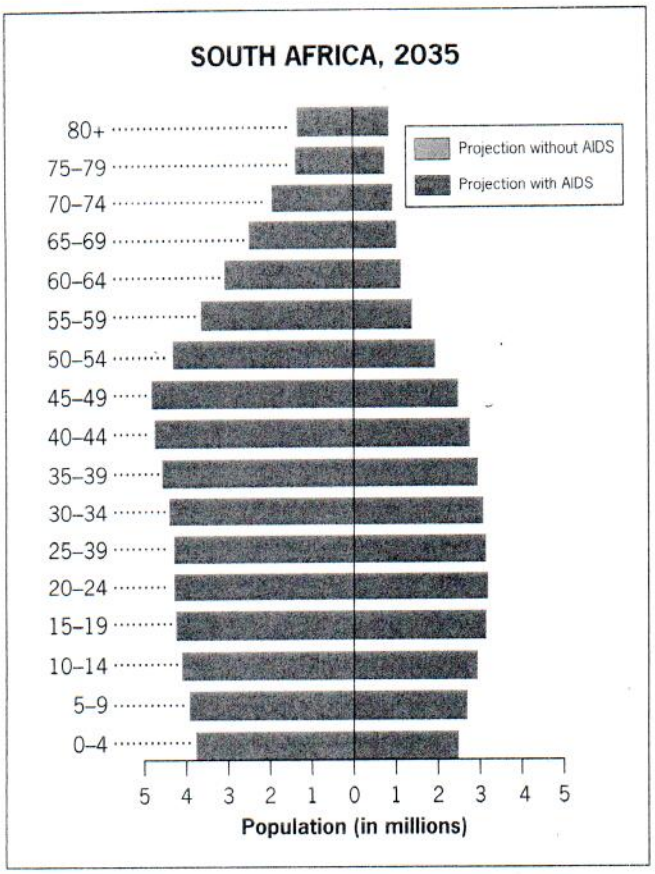


Figure 2.18
Affect of AIDS on the Population Pyramid for South Africa, predicted 2035. Estimated population, male and female, with AIDS and without AIDS. *Data from*: United States Census Bureau, 2005.

that in addition to the rising number of AIDS orphans, many young children, especially girls, are taken out of school to serve as care-givers for their relatives with AIDS (Figure 2.20). Robson found in her interviews with young care-givers that "more children are becoming young carers as households struggle to cope with income and labor losses through illness and mortality."

There are few positives to report. Uganda, once Africa's worst afflicted country, has slowed the growth of AIDS through an intensive, government-sponsored campaign of propaganda and action—notably the distribution of condoms in even the remotest part of the country. In the world's wealthier countries, remedies have been developed that can stave off the effects of AIDS for many years. But African countries cannot afford such luxuries. United Nations calculations suggest that globally upwards of $20 billion needs to be spent to slow AIDS and malaria; in 2003, only about $5 billion was available. The impact of AIDS will be felt in African economies and in African demographics for generations to come. The "slim disease," as some Africans call it, will constrain African economic development and require world intervention to overcome.

The Maladies of Longer Life Expectancy

Although AIDS has become the leading cause of death in Subsaharan Africa, the number of fatal AIDS cases in the rest of the world remains far smaller than those of the **chronic diseases**. Chronic diseases (also called degenerative diseases) are the afflictions of middle and old age, reflecting higher life expectancies. Among the chronic diseases are heart disease, cancer, stroke, and lung ailments. In the United States 100 years ago, tuberculosis, pneumonia, diarrheal diseases, and heart diseases (in that order) were the chief killers. Today, heart disease and cancer head the list, with cerebral hemorrhage (stroke) next and accidents also high on the list (Table 2.1). In the early 1900s, tuberculosis and pneumonia caused 20 percent or all deaths; today, they cause fewer than 5 percent. The diarrheal diseases, which were so high on the old list, are now primarily children's maladies. Today, these diseases are not even on the list of the 10 leading causes of death.

At the global scale, diseases of infancy have been largely defeated, and such infectious diseases as tuberculosis and pneumonia are less serious threats than they were. The battles against cancer and heart disease, however, are far from won. Recent decades have brought new lifestyles, new pressures, new consumption patterns, and exposure to new chemicals, and we do not know how these affect our health. People often smoke cigarettes because they find it relaxing, but lung cancer—a major modern killer—is linked to smoking. In order to distribute adequate food supplies to populations in huge urban areas, we add various kinds of preservatives to foods without knowing exactly how they will affect our health in the long run. We substitute artificial flavoring for sugar and other calorie-rich substances, but some of those substitutes have been proven to be dangerous. Despite all the sugar substitutes, obesity plagues much of the U.S. population, bringing with it heart disease and diabetes. Even the treatment of drinking water with chemicals is rather recent in the scheme of global population change, and we do not know its long-term effects. Future chronic diseases may come from practices we take for granted as normal now.

THINKING GEOGRAPHICALLY

In the United States, the national infant mortality rate (IMR) is 7.0. That number represents an average for the country. Think about the differences in IMR in the United States across regions, ethnicities, social classes, and other sectors.

Field Note

The day was so beautiful and the children's faces so expressive I could hardly believe I was visiting an AIDS hospice village set up for children. The Sparrow Rainbow Village on the edges of Johannesburg, South Africa, is the product of an internationally funded effort to provide children with HIV the opportunity to spend what time they have in a clean, safe environment. Playing with the children brought home the fragility of human life and the extraordinary impacts of a modern plague that has spread relentlessly across significant parts of Sub-Saharan Africa.

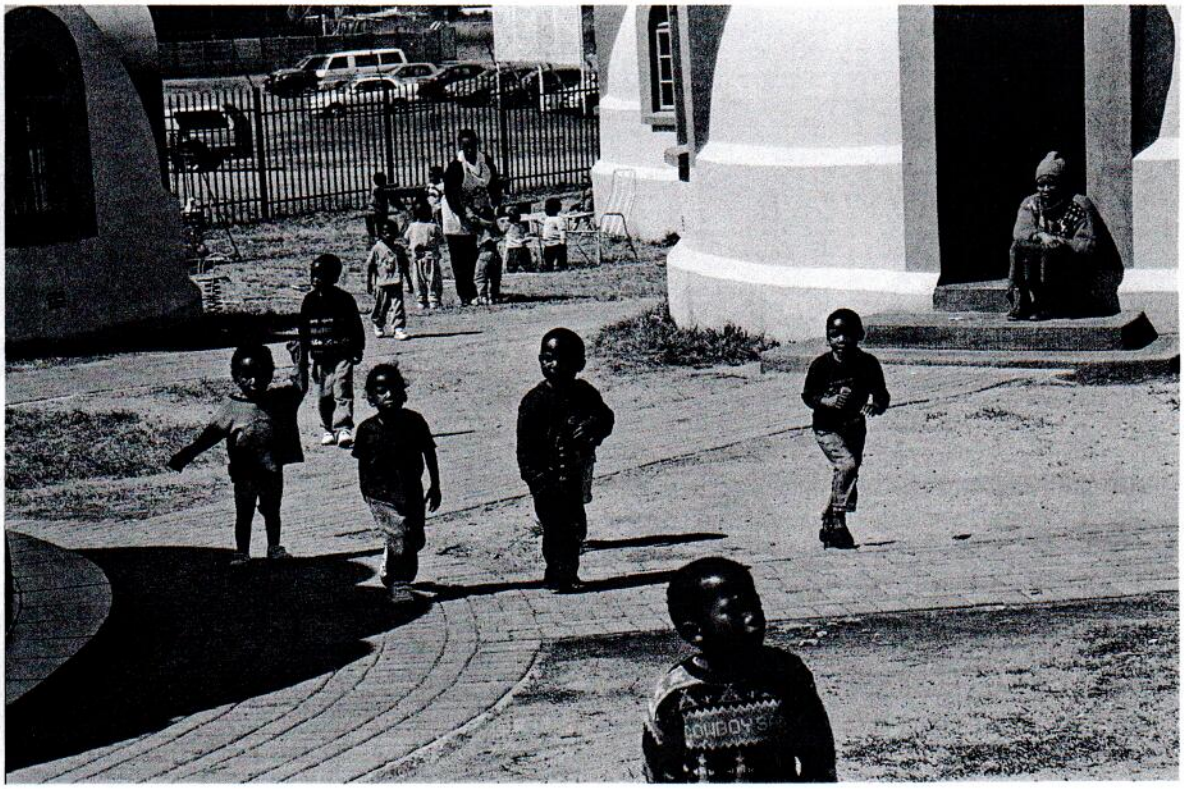


Figure 2.19
Johannesburg, South Africa. © Alexander B. Murphy.

Hypothesize what the differences are—where and for whom is IMR highest and lowest and why? Use the population Internet sites listed at the end of this chapter to determine whether your hypotheses are correct.

HOW DO GOVERNMENTS AFFECT POPULATION CHANGE?

Over the past century, many of the world's governments have instituted policies designed to influence the overall growth rate or ethnic ratios within the population. Certain policies directly affect the birth rate via laws ranging from subsidization of abortion to forced sterilization. Others influence family size through taxation or subvention. These policies fall into three groups: expansive, eugenic, and restrictive.

The former Soviet Union and China under Mao Zedong led other communist societies in **expansive population policies**, which encourage large families and raise the rate of natural increase. Ideological, anticapitalist motives drove those policies, now abandoned. Today, some countries are again pursuing expansive population policies—because their populations are aging and declining. The aging population in Europe has encouraged some counties to embark on policies to encourage (through tax incentives and by other fiscal means) families to have more children.

Guest Field Note

Marich Village, Kenya

This drawing was done by a Pokot boy in a remote primary school in North Western Kenya. He agreed to take part in my fieldwork some years after I had started researching young carers in sub-Saharan Africa. Since those early interviews in Zimbabwe I have been acutely aware of young carers' invisibility—you can't tell who is a young carer just by looking at them. Indeed, invisibility is a characteristic of many aspects of the social impacts of HIV/AIDS. This young person drew himself working in the fields and taking care of cattle. The reasons why African young people help with farming and herding are many, but for young caregivers assisting their sick family members in this way is especially important.

Credit: Elsbeth Robson, Keele University

Figure 2.20

In the past, some governments engaged in **eugenic population policies**, which were designed to favor one racial or cultural sector of the population over others. Nazi Germany was a drastic example of eugenics, but other countries also have pursued eugenic strategies, though in more subtle ways. Up until the time of the civil rights movement in the 1960s, some observers accused the United States of pursuing social policies tinged with eugenics that worked against the interests of African Americans. Some argue that Japan's nearly homogeneous culture is the result of deliberately eugenic social policies. Eugenic population policies can be practiced covertly through discriminatory taxation, biased allocation of resources, and other forms of racial favoritism.

TABLE 2-1
Leading Causes of Death in the United States, 2002. *Data from*: Center for Disease Control, National Center for Health Statistics, 2005.

LEADING CAUSES OF DEATH IN THE UNITED STATES, 2002

Cause	Total	Percent
1. Heart Disease	696,947	28.5
2. Cancer	557,271	22.8
3. Stroke	162,672	6.7
4. Lung Diseases	124,816	5.1
5. Accidents	106,742	4.4
6. Diabetes	73,249	3.0
7. Influenza and Pneumonia	65,681	2.7
8. Alzheimer's Disease	58,866	2.4
9. Nephritis, Nephritic Syndrome, and Nephrosis	40,974	1.7
10. Septicemia	33,865	1.4

Today the majority of the world's governments seek to reduce the rate of natural increase through various forms of **restrictive population policies**. These policies range from toleration of officially unapproved means of birth control to outright prohibition of large families. China's "one-child-only" policy, instituted after the end of the Maoist period, drastically reduced China's growth rate from one of the world's fastest to one of the developing world's slowest (Fig. 2.21). The policy had unintended consequences and has been relaxed somewhat in recent years.

Limitations

Many governments have learned that changing circumstances tend to overtake their carefully constructed popu-

Figure 2.21
Chengdu, China. A large billboard warning readers to follow China's one-child policy. © H. J. de Blij.

lation policies; the case of Sweden is one example. In the 1980s, the government of Sweden instituted programs to promote higher fertility rates in the country. The programs focused on financial incentives, trying to alleviate much of the cost involved in having and raising children. In Sweden, couples who work and have small children receive cash payments, tax incentives, and job leaves and work flexibility that last up to eight years after the birth of a child. In the short term, the policies sent Sweden into a birth-boom. The country experienced a huge growth in the birth rate in 1991. Despite all of the financial incentives, when the Swedish economy slowed shortly thereafter, so did the birth rate. The children born in 1991 make up a class of 130,000 students in the Swedish education system. But the children born three years later, in 1994, make up a class of only 75,000 students. The government had to build new classrooms for the temporary population boom, and now shift students and teachers around as the children born in 1991 work their way through the education system. The Swedish government continues to think about other ways to promote higher birth rates. In 2002, a spokeswoman for the Christian Democrat party urged Swedish television to show racier programming at night in hopes of returning the population to a higher birth rate.

Contradictions

The areas of the world with the lowest population growth rates (Fig. 2.9) are in the very heart of the Roman Catholic world. Adherence to Catholic doctrine on family planning, it would appear, is far stronger in areas remote from the Vatican. Another case in point is in the Philippines, Asia's only Roman Catholic country. Here, the still-powerful church opposes the use of artificial contraceptives, and church and state are locked in a battle over birth control. The Philippine constitution prohibits abortion. In the first decade of the twenty-first century, population growth in the Philippines remained one of Asia's highest at 2.2 percent.

Among Islamic countries, the geographic pattern is the opposite. Saudi Arabia, home to Mecca—the hearth of Islam—has one of the world's fastest growth rates (3.0 percent). But in far-off Indonesia (the Philippines' neighbor), the government began a nationwide family-planning program in 1970. When fundamentalist Muslim leaders objected, the government used a combination of coercion and inducement to negate their influence. By 2000, Indonesia's family-planning program lowered the growth rate to 1.6 percent, far below that of the Philippines.

THINKING GEOGRAPHICALLY

When studying government policies on population, one of the most important things to remember is unintended consequences. Choose one country in the world where women have little access to education and are disempowered. Consider the previous section of this chapter on age composition, and determine how restrictive population policies in this country will alter the population composition of the country.