KEY ISSUE 2

Why Is Global Population Increasing?

- Components of Population Growth
- Population Structure

Learning Outcome 2.2.1
Understand how to measure population growth through the natural increase rate.

Population increases rapidly in places where many more people are born than die, and it declines in places where deaths outnumber births. The population of a place also increases when people move in and decreases when people move out. This element of population change—migration—is discussed in Chapter 3.
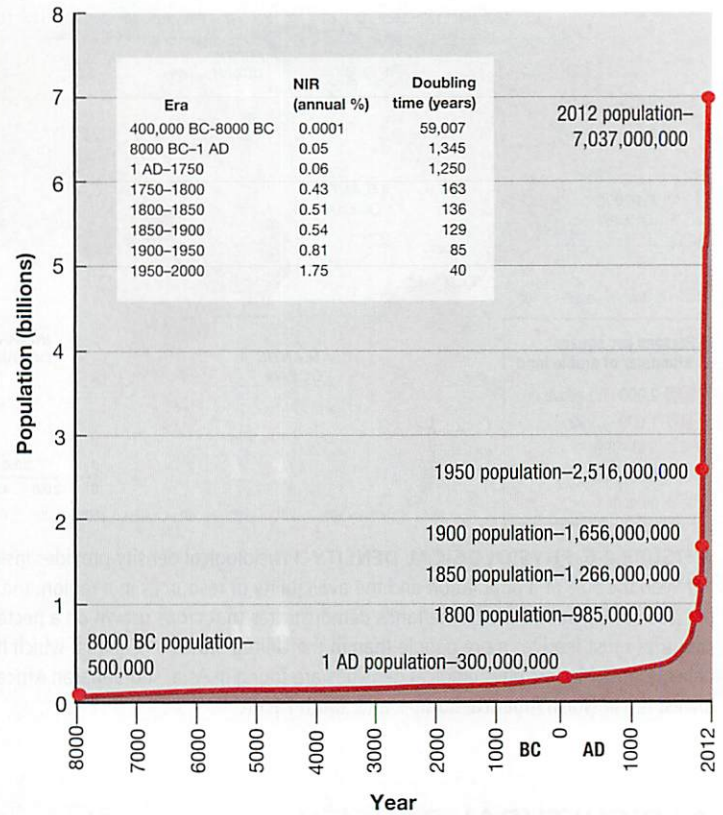
COMPONENTS OF POPULATION GROWTH

Geographers most frequently measure population change in a country or the world as a whole by using three measures:

- **Crude birth rate (CBR)** is the total number of live births in a year for every 1,000 people alive in the society. A CBR of 20 means that for every 1,000 people in a country, 20 babies are born over a one-year period.

- **Crude death rate (CDR)** is the total number of deaths in a year for every 1,000 people alive in the society. Comparable to the CBR, the CDR is expressed as the annual number of deaths per 1,000 population.

- **Natural increase rate (NIR)** is the percentage by which a population grows in a year. It is computed by subtracting CDR from CBR, after first converting the two measures from numbers per 1,000 to percentages (numbers per 100). Thus if the CBR is 20 and the CDR is 5 (both per 1,000), then the NIR is 1.5 percent, or 15 per 1,000. The term *natural* means that a country's growth rate excludes migration.

NATURAL INCREASE

During the twenty-first century, the world NIR has been 1.2, meaning that the population of the world had been growing each year by 1.2 percent. The world NIR is lower today than its all-time peak of 2.2 percent in 1963, and it has declined sharply since the 1990s. However, the NIR during the second half of the twentieth century was high by historical standards. Most of humanity's

Era	NIR (annual %)	Doubling time (years)
400,000 BC-8000 BC	0.0001	59,007
8000 BC-1 AD	0.05	1,345
1 AD-1750	0.06	1,250
1750-1800	0.43	163
1800-1850	0.51	136
1850-1900	0.54	129
1900-1950	0.81	85
1950-2000	1.75	40

2012 population—7,037,000,000

1950 population—2,516,000,000

1900 population—1,656,000,000

1850 population—1,266,000,000

1800 population—985,000,000

8000 BC population—500,000

1 AD population—300,000,000

▲ FIGURE 2-8 **WORLD POPULATION THROUGH HISTORY** Through most of human history population growth was virtually nil. Population increased rapidly beginning in the eighteenth century.

several-hundred-thousand-year occupancy of Earth was characterized by an NIR of essentially zero, and Earth's population was unchanged, at perhaps a half-million (Figure 2-8).

About 82 million people are being added to the population of the world annually (Figure 2-9). This number represents a decline from the historic high of 87 million in 1990. The number of people added each year has dropped much more slowly than the NIR because the population base is much higher now than in the past.

World population increased from 3 to 4 billion in 14 years, from 4 to 5 billion in 13 years, and from 5 to 6 billion and 6 to 7 billion in 12 years. As the base continues to grow in the twenty-first century, a change of only one-tenth of 1 percent can produce very large swings in population growth.

The rate of natural increase affects the **doubling time**, which is the number of years needed to double a population, assuming a constant rate of natural increase. At the early twenty-first-century rate of 1.2 percent per year, world population would double in about 54 years. If the same NIR continued through the twenty-first century, global population in the year 2100 would reach 24 billion. When the NIR was 2.2 percent in 1963, doubling time was 35 years. Had the 2.2 percent rate continued into the twenty-first century, Earth's population in 2010 would
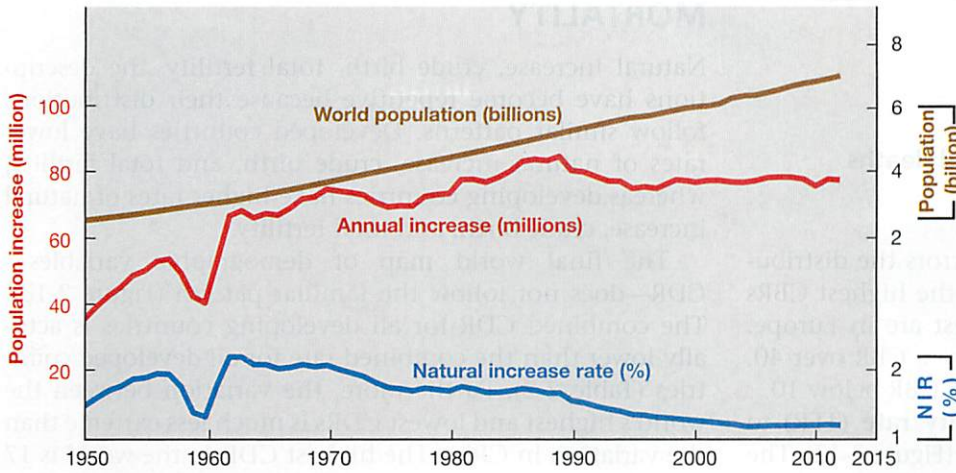
◄ **FIGURE 2-9 WORLD POPULATION GROWTH, 1950–2011** The NIR declined from its historic peak in the 1960s, but the number of people added each year has not declined very much because with world population increasing from 2.5 billion to more than 7 billion people during the period, the percentage has been applied to an ever larger base.

have been nearly 10 billion instead of nearly 7 billion. A 2.2 percent NIR through the twenty-first century would produce a total population of more than 50 billion in 2100.

More than 95 percent of the natural increase is clustered in developing countries (Figure 2-10). The NIR exceeds 2.0 percent in most countries of sub-Saharan Africa, whereas it is negative in Europe, meaning that in the absence of immigrants, population actually is declining. About one-third of the world's population growth during the past decade has been in South Asia, one-fourth in sub-Saharan Africa, and the remainder divided about equally among

East Asia, Southeast Asia, Latin America, and Southwest Asia & North Africa.

Regional differences in NIRs mean that most of the world's additional people live in the countries that are least able to maintain them. To explain these variations in growth rates, geographers point to regional differences in fertility and mortality rates.

Pause and Reflect 2.2.1
The United States has an NIR of 0.6. Does that mean the doubling time is more than 54 years or less?
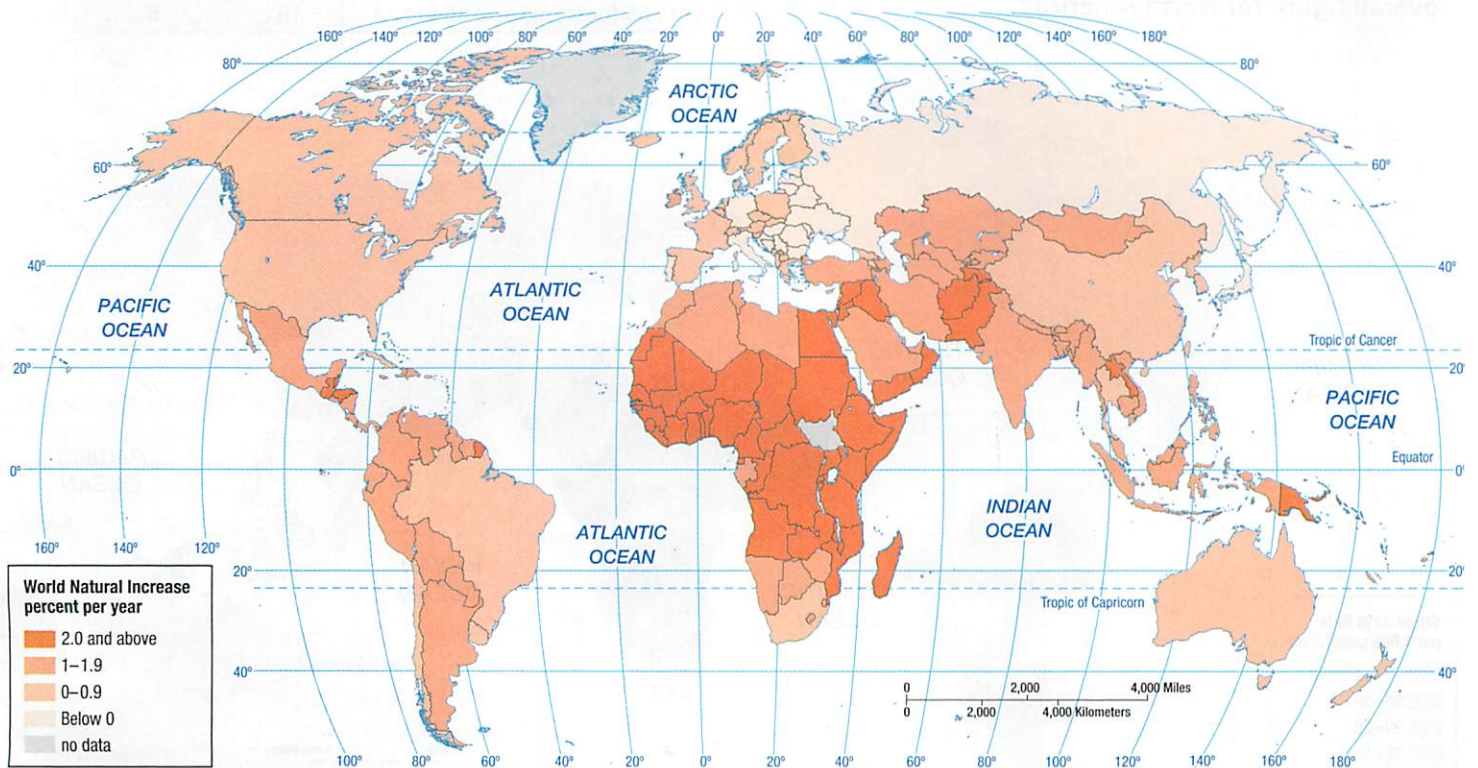

▲ **FIGURE 2-10 NATURAL INCREASE RATE** The world average is currently about 1.2 percent. The countries with the highest NIRs are concentrated in Africa and Southwest Asia.

FERTILITY

The world map of CBR (Figure 2-11) mirrors the distribution of NIR. As was the case with NIRs, the highest CBRs are in sub-Saharan Africa, and the lowest are in Europe. Many sub-Saharan African countries have a CBR over 40, whereas many European countries have a CBR below 10.

Geographers also use the **total fertility rate (TFR)** to measure the number of births in a society (Figure 2-12). The TFR is the average number of children a woman will have throughout her childbearing years (roughly ages 15 through 49). To compute the TFR, demographers assume that a woman reaching a particular age in the future will be just as likely to have a child as are women of that age today. Thus, the CBR provides a picture of a society as a whole in a given year, whereas the TFR attempts to predict the future behavior of individual women in a world of rapid cultural change.

The TFR for the world as a whole is 2.5, and, again, the figures vary between developed and developing countries. The TFR exceeds 5.0 in sub-Saharan Africa, compared to 2 or less in nearly all European countries.

Pause and Reflect 2.2.2
**How does the TFR in your family compare to the overall figure for North America?**

MORTALITY

Natural increase, crude birth, total fertility, the descriptions have become repetitive because their distributions follow similar patterns. Developed countries have lower rates of natural increase, crude birth, and total fertility, whereas developing countries have higher rates of natural increase, crude birth, and total fertility.

The final world map of demographic variables—CDR—does not follow the familiar pattern (Figure 2-13). The combined CDR for all developing countries is actually lower than the combined rate for all developed countries (Table 2-2). Furthermore, the variation between the world's highest and lowest CDRs is much less extreme than the variation in CBRs. The highest CDR in the world is 17 per 1,000, and the lowest is 1—a difference of 16—whereas

**TABLE 2–2   COMPARING DEMOGRAPHIC FACTORS IN DEVELOPED AND DEVELOPING COUNTRIES**

	Developed Countries	Developing Countries
Natural increase rate	0.2	1.4
Crude birth rate	11	22
Total fertility rate	1.7	2.6
Infant mortality rate	5	48
Life expectancy (years)	78	68
Crude death rate	10	8
Under age 15 (percent)	16	29
Age 65 (percent) and above	16	6
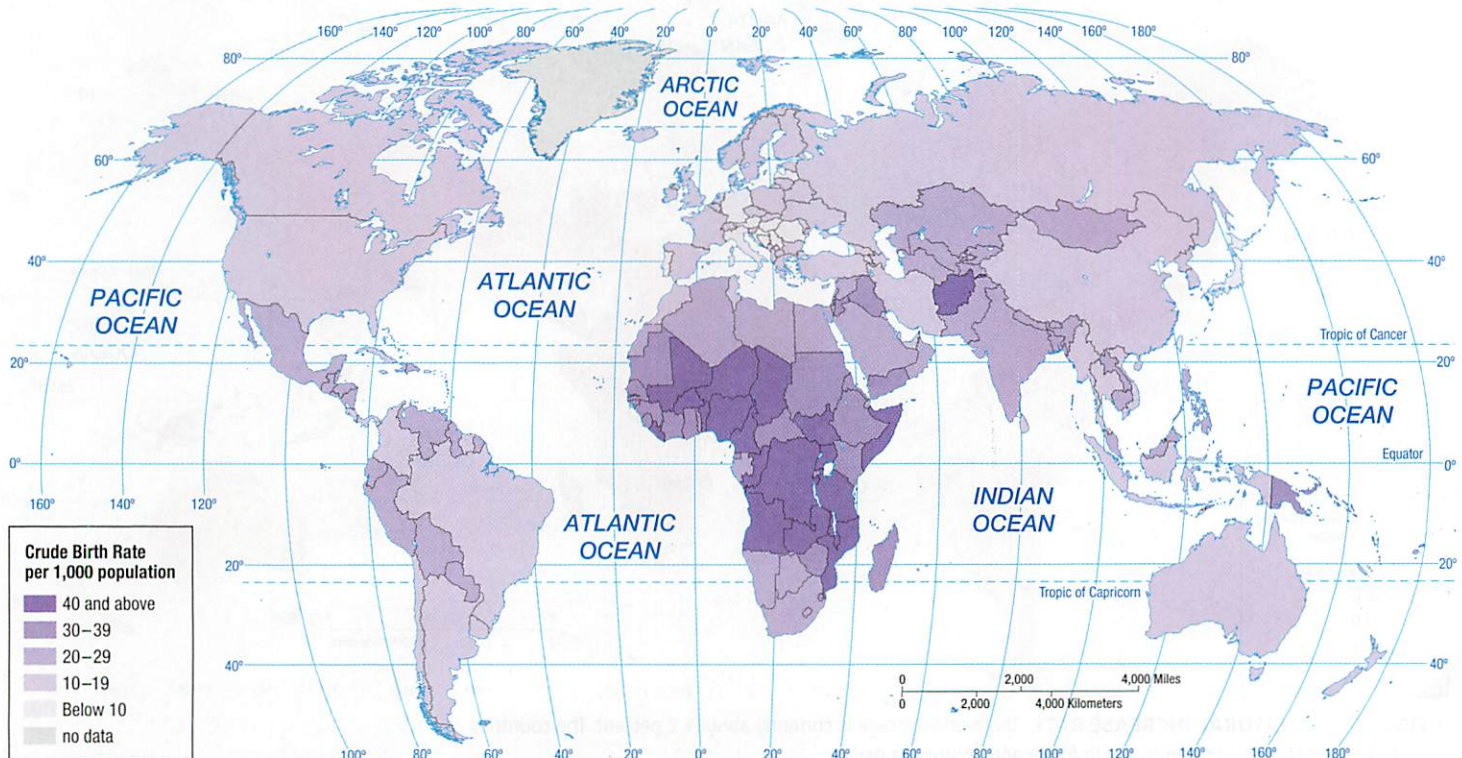
▲ FIGURE 2-11 CRUDE BIRTH RATE (CBR) The global distribution of CBRs parallels that of NIRs. The countries with the highest CBRs are concentrated in Africa and Southwest Asia.
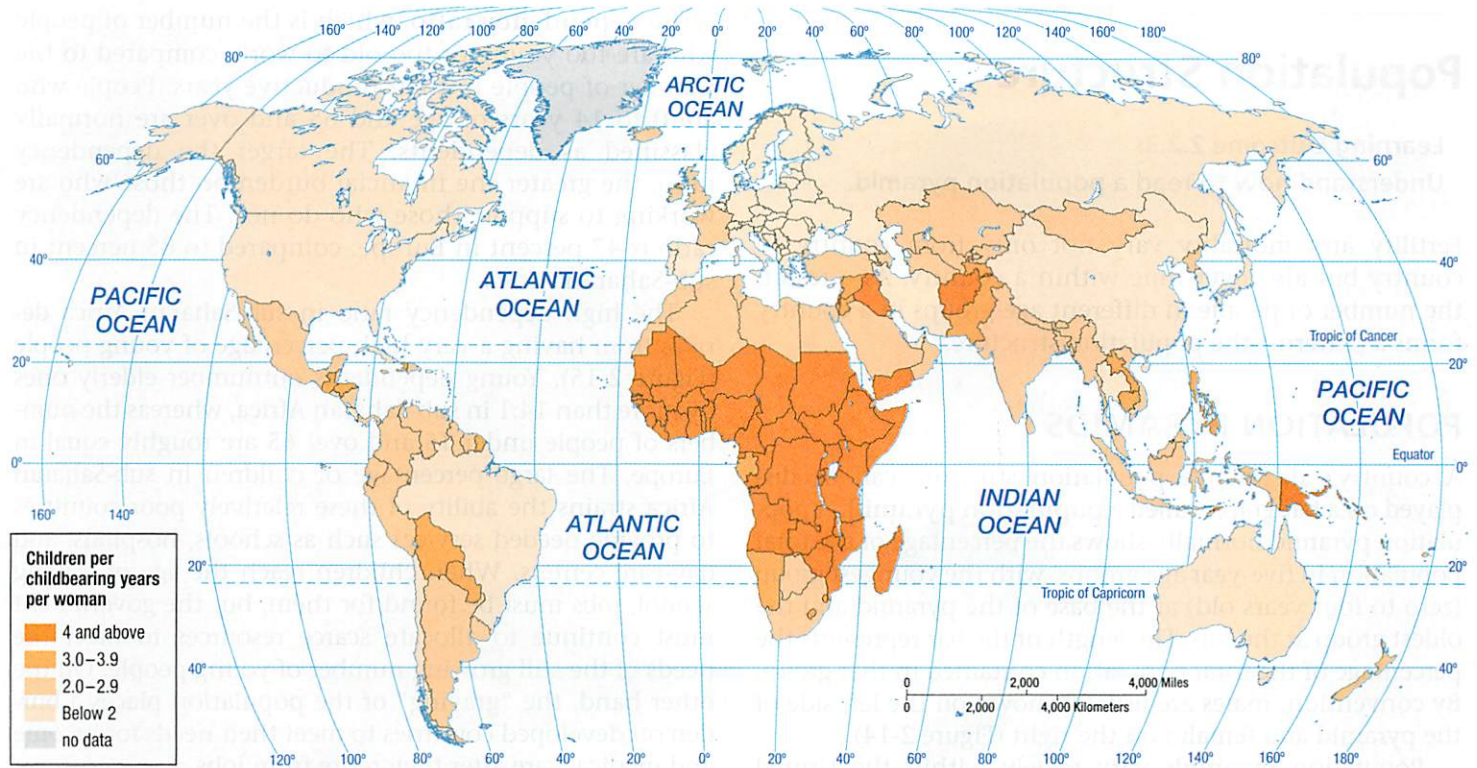
▲ **FIGURE 2-12 TOTAL FERTILITY RATE (TFR)**
As with NIRs and CBRs, the countries with the highest TFRs are concentrated in Africa and Southwest Asia.

Children per
childbearing years
per woman
- 4 and above
- 3.0–3.9
- 2.0–2.9
- Below 2
- no data
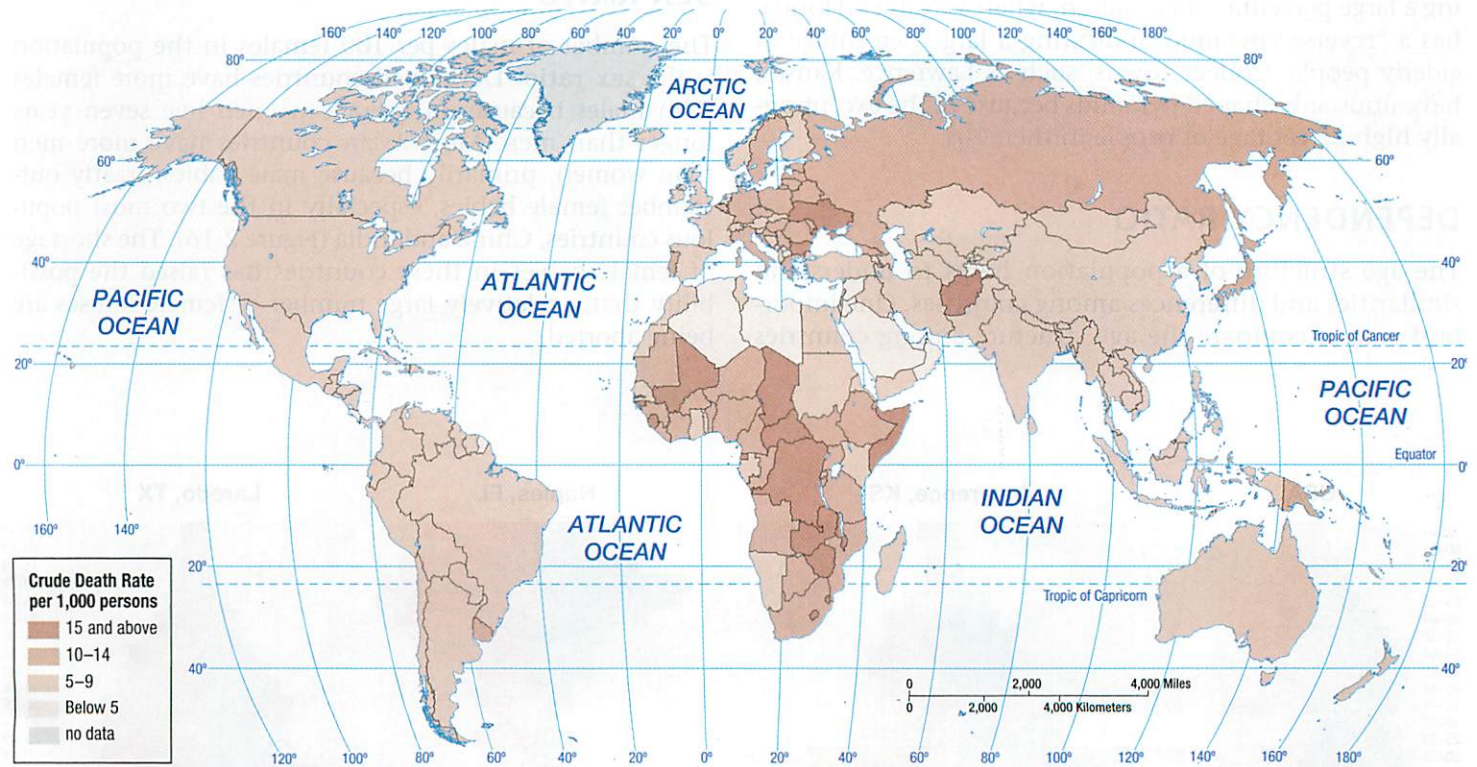
▲ **FIGURE 2-13 CRUDE DEATH RATE (CDR)** The global pattern of CDRs varies from those for the other demographic variables already mapped in this chapter. The demographic transition helps to explain the distinctive distribution of CDRs.

Crude Death Rate
per 1,000 persons
- 15 and above
- 10–14
- 5–9
- Below 5
- no data

CBRs for individual countries range from 7 per 1,000 to 52, a spread of 45.

Why does Denmark, one of the world's wealthiest countries, have a higher CDR than Cape Verde, one of the poorest? Why does the United States, with its extensive system of hospitals and physicians, have a higher CDR than Mexico and nearly every country in Latin America? The answer is that the populations of different countries are at various stages in an important process known as the demographic transition, discussed later in this chapter.

Population Structure

Learning Outcome 2.2.3:
Understand how to read a population pyramid.

Fertility and mortality vary not only from country to country but also over time within a country. As a result, the number of people in different age groups in a country forms a pattern—the population structure.

POPULATION PYRAMIDS

A country's distinctive population structure can be displayed on a bar graph called a **population pyramid**. A population pyramid normally shows the percentage of the total population in five-year age groups, with the youngest group (zero to four years old) at the base of the pyramid and the oldest group at the top. The length of the bar represents the percentage of the total population contained in that group. By convention, males are usually shown on the left side of the pyramid and females on the right (Figure 2-14).

Population pyramids vary widely within the United States. For example, Laredo, Texas, which has a large Hispanic population, has a relatively broad pyramid, indicating a large percentage of children, whereas Naples, Florida, has a "reverse" pyramid, indicating a large percentage of elderly people. College towns, such as Lawrence, Kansas, have unusually shaped pyramids because of the exceptionally high percentage of people in their 20s.

DEPENDENCY RATIO

The age structure of a population helps to understand similarities and differences among countries. One important way to compare the age structure among countries is the **dependency ratio**, which is the number of people who are too young or too old to work, compared to the number of people in their productive years. People who are 0 to 14 years of age and 65 and over are normally classified as dependents. The larger the dependency ratio, the greater the financial burden on those who are working to support those who do not. The dependency ratio is 47 percent in Europe, compared to 85 percent in sub-Saharan Africa.

The high dependency ratio in sub-Saharan Africa derives from having a very high percentage of young people (Figure 2-15). Young dependents outnumber elderly ones by more than 14:1 in sub-Saharan Africa, whereas the numbers of people under 15 and over 65 are roughly equal in Europe. The large percentage of children in sub-Saharan Africa strains the ability of these relatively poor countries to provide needed services such as schools, hospitals, and day-care centers. When children reach the age of leaving school, jobs must be found for them, but the government must continue to allocate scarce resources to meet the needs of the still growing number of young people. On the other hand, the "graying" of the population places a burden on developed countries to meet their needs for income and medical care after they retire from jobs.
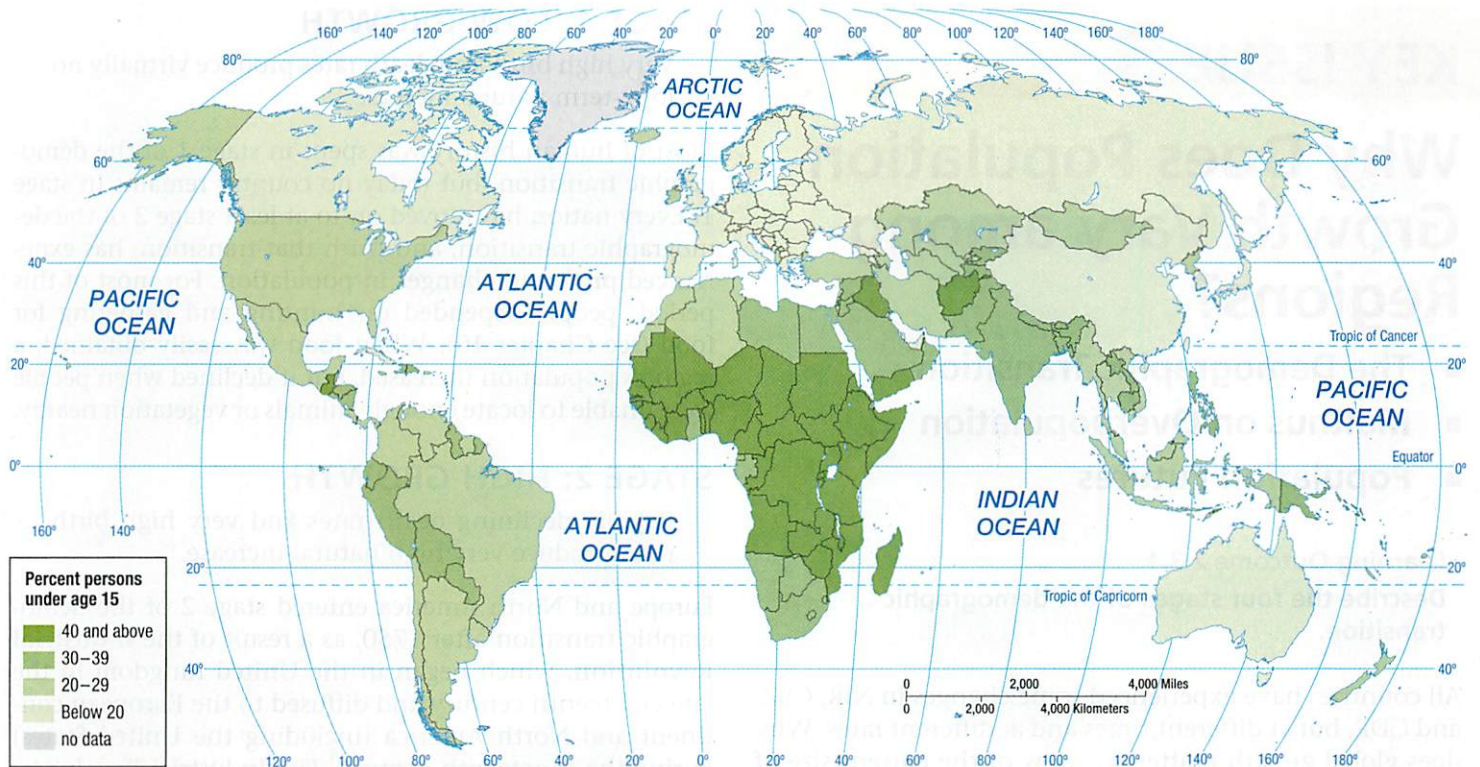
SEX RATIO

The number of males per 100 females in the population is the **sex ratio.** Developed countries have more females than males because on average women live seven years longer than men. Most Asian countries have more men than women, primarily because male babies greatly outnumber female babies, especially in the two most populous countries, China and India (Figure 2-16). The shortage of female babies in these countries has raised the possibility that a relatively large number of female fetuses are being aborted.
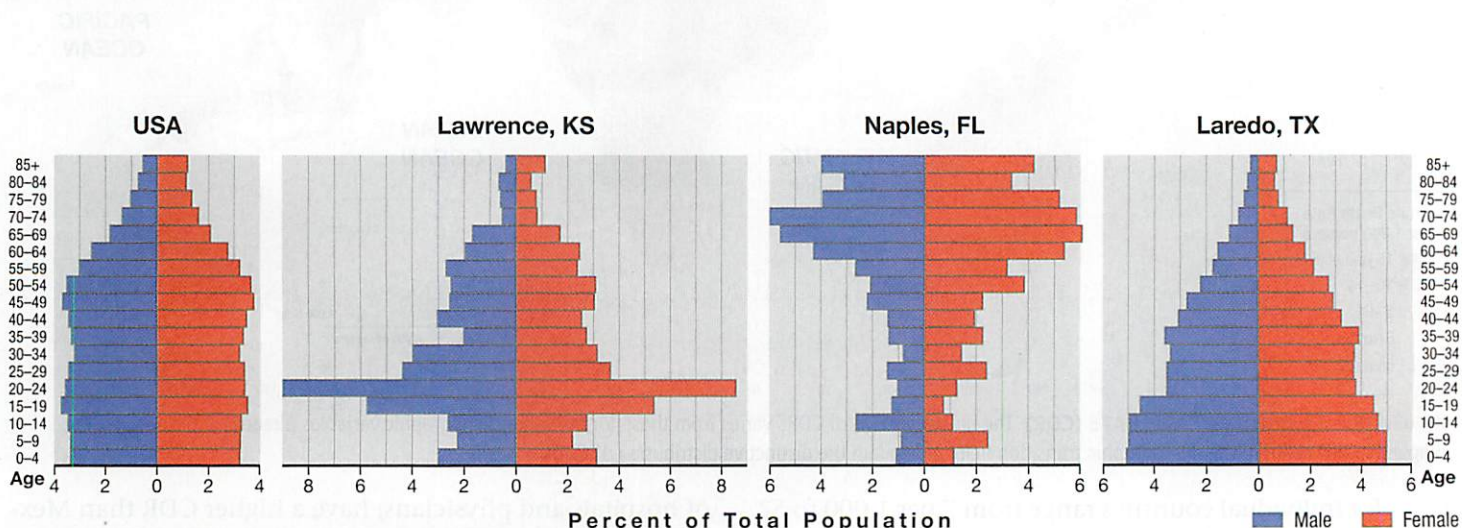

▲ FIGURE 2-14 POPULATION PYRAMIDS FOR THE UNITED STATES AND SELECTED U.S.
COMMUNITIES Laredo has a broad pyramid, indicating higher percentages of young people and fertility rates.
Lawrence has a high percentage of people in their twenties because it is the home of the University of Kansas.
Naples has a high percentage of elderly people, especially women, so its pyramid is upside down.

Percent persons under age 15
- 40 and above
- 30–39
- 20–29
- Below 20
- no data

▲ FIGURE 2-15 **POPULATION UNDER AGE 15** Sub-Saharan Africa has the highest percentage of persons under age 15.
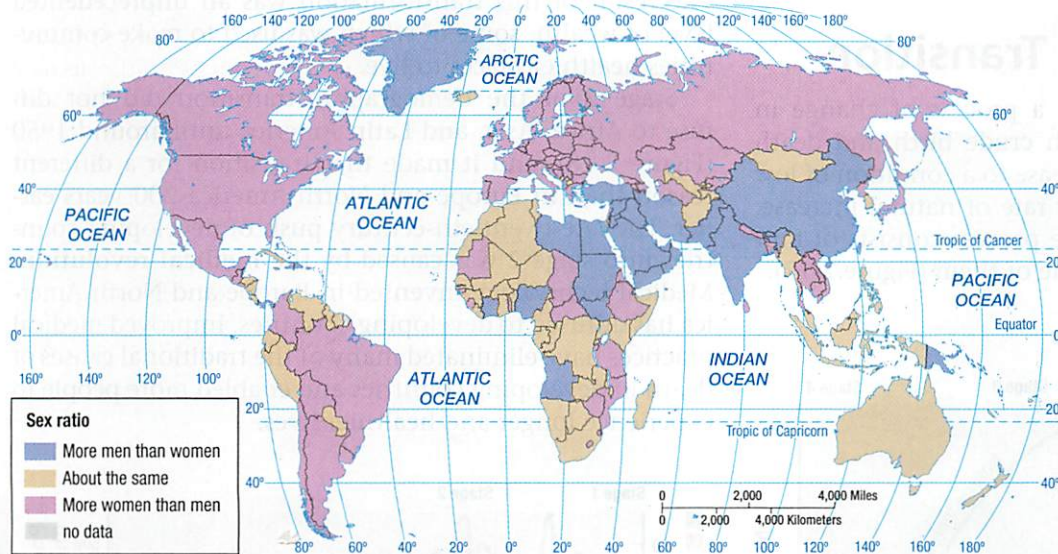
◀ FIGURE 2-16 **SEX RATIO** A map of the percentage of people over age 65 would show a reverse pattern, with the highest percentages in Europe and the lowest in Africa and Southwest Asia.

Sex ratio
- More men than women
- About the same
- More women than men
- no data

Pause and Reflect 2.2.3
Name a type of community that might have a lot more males than females.

CHECK-IN: KEY ISSUE 2

Why Is Global Population Increasing?

✓ The NIR measures population growth as the difference between births and deaths.

✓ Births and deaths are measured using several indicators.

✓ A community's distinctive distribution by age and gender can be displayed in a population pyramid.