Population Ecology

chapter 4

section 2 Human Population

MAIN Idea

Human population growth changes over time.

What You'll Learn
- the age structure of nongrowing, slowly growing, and rapidly growing countries
- consequences of continued population growth

Study Coach

Create a Quiz As you read this section, write quiz questions based on what you have learned. After you write the questions, answer them.

💡 Think it Over

1. Describe a technology, not yet invented, that could increase the human carrying capacity.

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● Before You Read

Think about the characteristics of populations that you read about in Section 1. On the lines below, explain how these characteristics might apply to human populations. Then read the section to learn about human populations.

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● Read to Learn

Human Population Growth

Demography (de MAH gra fee) is the study of human population size, density, distribution, movement, and birth and death rates. The human population remained fairly stable for thousands of years, but it has recently increased.

How has technology affected growth?

Humans have learned to change their environment in ways that increase the carrying capacity. Agriculture and domestication of animals have increased the human food supply. Technological advances, such as in medicine and shelter construction, have reduced the death rate. The current growth rate is just over 80 million people per year. By 2050, the population is expected to be nine billion.

Although the human population is growing, the rate of growth has slowed. Human population growth peaked at over 2.2 percent in 1962. By 2003, the rate of growth had dropped to almost 1.2 percent. The decline in growth is due primarily to diseases such as AIDS and voluntary population control.

Trends in Human Population Growth

Events such as disease and war can change population trends. Human population growth is not the same in all countries. However, countries with similar economies tend to have similar population growth trends. ☑

For example, one trend is a change in the population growth rate in industrially developed countries, such as the United States. An industrially developed country has advanced industry and technology and a high standard of living. Early in its history, the United States had a high birthrate and a high death rate. Many children died before reaching adulthood. Typically, individuals died by their early forties. In recent years, the birthrate in the United States has decreased a lot. The average lifespan is now more than 70 years. A change from high birth and death rates to low birth and death rates in a population is called a **demographic transition**.

How is population growth rate calculated?

As an example, we will calculate and compare the 2008 population growth rates for the United States and Honduras, a small country in Central America. The calculation for PGR is [birthrate − death rate + migration rate] = PGR (%)

In our example, we'll have to divide the final answer by 10 to get a percentage because the rates are calculated per 1000. The United States has birthrate 14.1 (per 1000), death rate 8.3 (per 1000), and migration rate 2.9 (per 1000). This gives a PGR of 0.87 percent for the United States.

Honduras has birthrate 26.9 (per 1000), death rate 5.4 (per 1000), and migration rate −1.3 (per 1000). This gives a PGR of 2.02 percent for Honduras.

What is zero population growth?

Zero population growth (ZPG) occurs when the birthrate equals the death rate. According to one estimate, the world will reach zero population growth between 2020 and 2029. Although the population will have stopped growing, births and deaths will continue at the same rate. At zero population growth, the number of people in different age groups should be nearly equal.

☑ **Reading Check**

2. List two events that can change human population trends.

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Applying Math

3. Apply Canada has birthrate 10.2 (per 1000), death rate 7.7 (per 1000), and migration rate 5.6 (per 1000). Calculate the PGR for Canada.
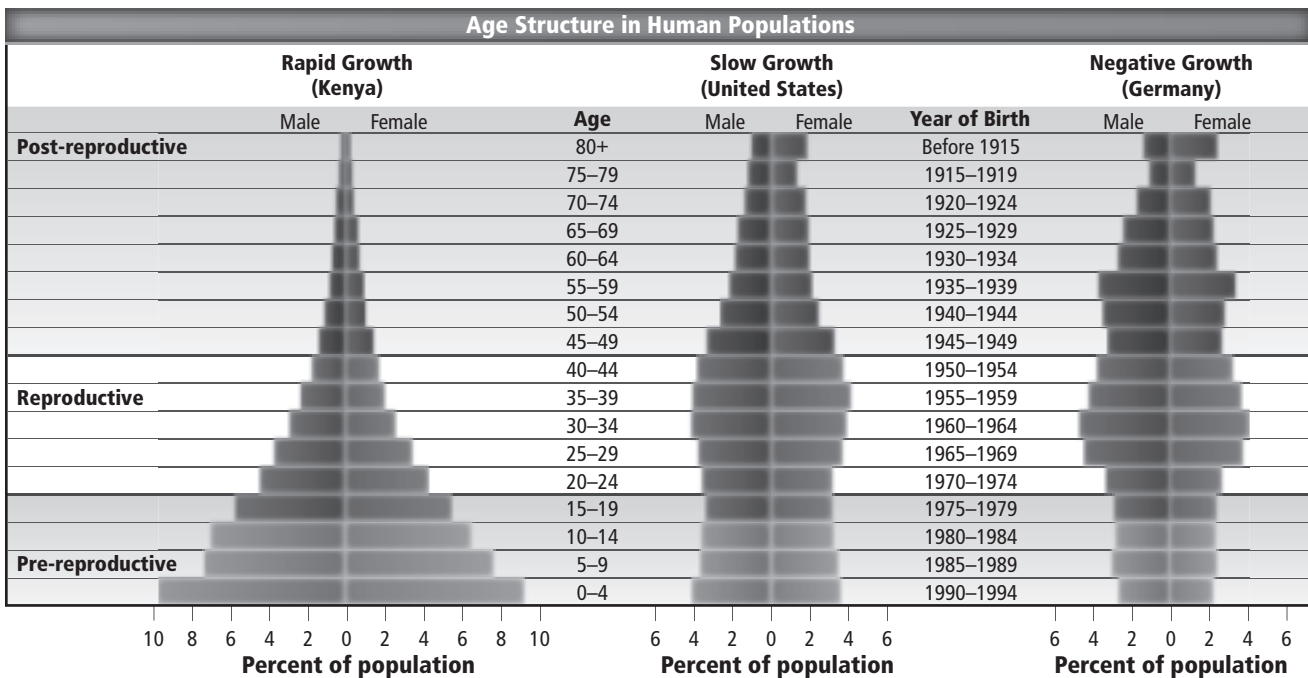
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How does age structure predict growth?

A population's __age structure__ is the number of males and females in each of three age groups. The groups are pre-reproductive (up to age 20), reproductive (ages 20 through 44), and post-reproductive (after age 44).

The figure below shows the age structure for three countries. Compare the shapes of the three diagrams. When the largest portion of the population is in the pre-reproductive stage, as in Kenya, the population is growing rapidly. When the smallest portion is pre-reproductive, as in Germany, the population is decreasing. When the reproductive and pre-reproductive groups are roughly equal, as in the United States, the population is growing slowly.

Age Structure in Human Populations

Rapid Growth (Kenya)		Slow Growth (United States)		Negative Growth (Germany)	

Post-reproductive / Reproductive / Pre-reproductive categories with age groups: 80+, 75–79, 70–74, 65–69, 60–64, 55–59, 50–54, 45–49, 40–44, 35–39, 30–34, 25–29, 20–24, 15–19, 10–14, 5–9, 0–4.

Year of Birth: Before 1915, 1915–1919, 1920–1924, 1925–1929, 1930–1934, 1935–1939, 1940–1944, 1945–1949, 1950–1954, 1955–1959, 1960–1964, 1965–1969, 1970–1974, 1975–1979, 1980–1984, 1985–1989, 1990–1994.

Percent of population

Why is human population growth a concern?

All populations have carrying capacities, including human populations. Scientists are concerned that the human population might exceed Earth's ability to support it. Like populations of other organisms, human overcrowding will lead to disease and starvation. Family planning in many countries is being used to slow the growth rate. ☑

Currently, individuals in industrially developed countries use far more resources than individuals in developing countries. Populations in developing countries are increasing rapidly. As these countries industrialize, resource use will also increase rapidly.