# Chapter 6

# The Human Population and Its Impact

### Key Term

### age structure

* birth rate
* crude birth rate
* crude death rate
* cultural carrying capacity
* death rate
* demographic transition
* family planning
* fertility rate
* infant mortality rate
* life expectancy
* migration
* population change
* replacement-level fertility
* total fertility rate (TFR)

**Key Concepts**

* **6-1** The continuing rapid growth of the human population and its impacts on natural capital raise questions about how long the human population can keep growing.
* **6-2A** Population size increases through births and immigration, and decreases through deaths and emigration.
* **6-2B** The average number of children born to the women in a population (total fertility rate) is the key factor that determines population size.
* **6-3** The numbers of males and females in young, middle, and older age groups determine how fast a population grows or declines.
* **6-4** We can slow human population growth by reducing poverty, elevating the status of women, and encouraging family planning.

### Key Questions and Case Studies

**CORE CASE STUDY**:

It took about 200,000 years for the human population to reach 2 billion. It took less than 50 years to add the second 2 billion. Twelve years later, in late 2011, we topped 7 billion. What is a sustainable level of human population?

**6-1 How do environmental scientists think about human population growth?**

1. The human population has grown rapidly due to technology, improved medical techniques, emphasis on hygiene, and expansion of agriculture and industry.
2. Population growth has slowed but is still growing exponentially.
3. The vast majority of all growth occurs in less-developed countries.
4. In 2050, there will be 7.8-10.8 billion people on the earth
5. Cultural carrying capacity is the maximum number of people that can live in reasonable freedom and comfort indefinitely without compromising the ability of earth to sustain future generations.

**SCIENCE FOCUS**: **How long can the human population keep growing?**

Estimates of future population growth vary widely. Demographers must rely on available data in making these predictions. However, current population estimates may not be accurate and assumptions must be made about future fertility. In addition, population predictions are made by a variety of different organizations.

**6-2 What factors influence the size of the human population?**

* 1. Population increases through births and immigration and decreases through deaths and emigration. [Population change = (Births + Immigration) – (Deaths + Emigration)]
     1. Population change is calculated by subtracting the number of people leaving a population (death and emigration) from the number entering it (birth and immigration).
  2. Fertility is the number of births that occur to an individual woman or in a population.

1. The changing nature of fertility rates affect population growth.

a. Replacement-level fertility is the number of children needed to replace their parents.

b. Total fertility rate (TFR) is the average number of children that a woman has during her fertile years.

**CASE STUDY**: **The U.S. population - third-largest and growing.**

The population of the United States is currently 310 million people. Although a drop in TFR has slowed the country’s growth, it is still growing faster than any other developed country. Because of high per capita resource use and waste, growth in the population of the United States has an enormous environmental impact.

* 1. Many factors influence birth and fertility rates.

1. More children work in developing countries; they are important to the labor force.
2. The economic cost of raising and educating children determines their numbers.
3. If there are available private/public pension systems, adults have fewer children because they do not need children to take care of them in old age.
4. People in urban areas usually have better access to family planning, so have fewer children.
5. If women have educational and economic choices, they tend to have fewer children.
6. The older the age at which women marry, the fewer children they bear.
7. If abortions are available and legal, women have fewer children.
8. The availability of reliable birth control allows women to space children and determines the number of children they bear.
   1. Factors that have caused a decline in death rates:

1. Better food supplies and nutrition, and safer water supplies contribute to people living longer.

2. Advances in medicine and public health, and improved sanitation and personal hygiene also contribute to people living longer.

* 1. Measures of overall health:

1. Life expectancy is the average number of years a newborn can expect to live.
2. Infant mortality rate is the number of babies out of every 1,000 born who die before their first birthday.

a. This rate reflects a country’s level of nutrition and health care.

b. It is the single best measure of a society’s quality of life.

1. U.S. infant mortality rate is higher than 40 other countries because:

a. Inadequate health care for poor women and for their babies

b. Drug addiction among pregnant women

c. High birth rate among teenagers

**SCIENCE FOCUS: Projecting population change.**

Estimates of population size by 2050 range from 7.8 to 10.8 billion. Demographers must consider different factors when projecting population size. First, they have to determine the reliability of current population estimates. Demographers also make estimates about trends in fertility. Population projections are made by a variety of organizations employing demographers.

* 1. Migration is also a factor in population change.

**6-3 How does a population’s age structure affect its growth or decline?**

Age structure diagrams are visual aids that show the distribution of males and females in each age group.

* 1. The percentages of males and females in the total population are divided into the following age categories:

1. Pre-reproductive ages span birth to 14 years of age.

2. Reproductive ages include age 15 through 44.

3. Post-reproductive ages include ages 45 and up.

* 1. The major determining factor in a country’s future population growth is the number of people under the age of 15.1.

**CASE STUDY**: **The American baby boom.**

Changes in the distribution of a country’s age groups have long-lasting economic and social impacts. An example of this is the ‘baby boom’ generation in the U.S. Such a group can dominate the population’s demands for goods and services as well as influence elections and legislation and economic demand. The graying of America may create economic problems for future generations.

* 1. Population decline can have long-term consequences, especially if the decline is rapid.

1. A gradual population decline, its harmful effects can usually be managed.

2. There can be a sharp rise in the proportion of older people.

a. Produces a sharp rise in public service costs, for health, etc.

b. May have many fewer working taxpayers and labor shortages.

c. It may be necessary to raise retirement age, raise taxes, cut retirement benefits, and increase legal immigration, which are generally unpopular moves.

3. If population declines because of deaths, consequences are serious.

a. Deaths from disease such as AIDS disrupt a country’s social and economic structure.

b. Large numbers of people in a particular age are removed from the country’s future.

1) Life expectancy drops.

2) In the case of AIDS, the deaths are mostly young adults, those who usually help run the country and everyday life for millions.

3) Two major goals are to reduce the spread of HIV through education and health care and to provide financial help for education, health care, and volunteer teachers and social workers to compensate for the lost young adults.

**6-4 How can we slow human population growth?**

1. A precautionary approach is adopted to slow or stop population growth. The three most important steps are to:
   1. Reduce poverty
   2. Elevate the status of women
   3. Encourage family planning
2. The demographic transition hypothesis states that as countries become industrialized, first their death rates rise and then their birth rates decline.
   1. Four stages: preindustrial, transitional, industrial, and postindustrial.
   2. Some failing states may be stuck in step 2.
3. Women have fewer children when they are educated, in control of their fertility, earn an income, and live in societies that do not suppress their rights.
4. Family planning helps reduce the number of births and abortions throughout the world.

1. Family planning has been responsible for at least 55% of the drop in TFRs in developing countries.

2. Family planning has also reduced both legal and illegal abortions per year.

3. Services come through educational and clinical services.

a. Women want to limit their pregnancies but have no access to contraceptives.

**CASE STUDY**: **Slowing population growth in India.**

India has tried to control its population growth for years. Poverty, malnutrition, and environmental problems abound in India. Efforts to limit population have not been especially successful because poor couples believe they need several children for work and care, and there is a strong preference for male children, so many do not use birth control. India is currently undergoing tremendous economic growth that will likely continue. This may increase the ecological footprint of the nation, but may also serve to hasten the demographic transition.

**CASE STUDY**: **Slowing population growth in China - a success story.**

China is the world’s most populous country. In the 1960s China’s population was growing so rapidly that there was a threat of mass starvation. To avoid this, the government put in place the world’s most strict family planning and birth control program. Since the program began the birth rate has declined from 5.7 children per woman to 1.5.

**Critical Thinking (Page 140) – Answer on a separate sheet of paper**

1. Do you think that the global population of 7.1 billion (Core Case Study) is too large? Explain. If your answer was yes, what do you think should be done to slow human population growth? If your answer was no, do you believe that there is a population size that would be too big? Explain.
2. If you could greet a new person every second without taking a break and working around the clock, how many people could you greet in one day? How many in a year? How long would it take you to greet the 84 million people who were added to the world’s population this year? How many years would it take you to greet all 7.1 billion people on the planet?
3. Which of the three major environmental worldviews do you believe underlie the two major positions on whether the world is overpopulated (Science Focus 6.1)?
4. Should everyone have the right to have as many children as they want? Explain. Is your belief on this issue consistent with your environmental worldview?
5. Is it rational for a poor couple in a less-developed country such as India to have four or five children? Explain.
6. Identify a major local, national, or global environmental problem, and describe the role population growth plays in this problem.
7. Some people believe the most important environmental goal is to sharply reduce the rate of population growth in less-developed countries, where at least 92% of the world’s population growth is expected to take place between now and 2050. Others argue that the most serious environmental problems stem from high levels of resource consumption per person in more-developed countries, which have much larger ecological footprints per person than do less-developed countries. What is your view on this issue? Explain.
8. Experts have identified population growth as one of the major causes of the environmental problems we face. The population of the United States is growing faster than that of any other more-developed country. However, this fact is rarely discussed, and the U.S. government has no official policy for slowing U.S. population growth. Why do you think this is so? Do you think there should be such a policy? If so, explain your thinking and list three steps you would take as a leader to slow U.S. population growth. If not, explain your thinking.