

## CHAPTER 10

### APPLYING POPULATION ECOLOGY: THE HUMAN POPULATION

#### Summary

1. Birth, death, fertility, and migration rates are the factors that determine population size. In developed countries, birth rates have declined, but population has increased due to immigration.
2. Women's fertility rates have dropped around the world but are still above the replacement-level fertility rate (2.1 in developed countries and as high as 2.5 in developing countries).
3. Both life expectancy (the average number of years a newborn can expect to live) and infant mortality rate (the number of babies/1000 who die before their first birthday) are indicators of the overall health of people in an area.
4. The population in Canada grew from 300 000, before the arrival of Europeans, to 3.3 million in 1867. It has increased approximately 10 times since Confederation. It is estimated that population growth in Canada will stabilize sometime before the end of the century. The total fertility rate is now well below the replacement level at 1.5, and immigration supplies two-thirds of the population growth.
5. Population size is profoundly affected by age structure. If women are past their primary child-bearing age, population increase will be limited. If the population has a large percentage of young women entering their childbearing years, there is a great potential for large population increases. In general, countries that have more women aged 15 to 40 years have more potential for a rapidly increasing population. In Canada and the United States, baby boomers make up about 50% of the population. Their retirement may create a worker shortage unless immigrants replace them.
6. We can influence population size by encouraging smaller families, encouraging adoption of children already born, and discouraging new births. Population size is also affected by health care or the lack of health care, epidemics (such as AIDS), losses through war, etc. Lack of prenatal care for expectant mothers, failure to protect children from communicable diseases (like measles) or widespread diseases (like malaria) can contribute to a smaller population. Economic development, family planning, and economic opportunities for women have reduced birth rates.
7. The four stages of the demographic transition are the preindustrial, the transitional, the industrial, and the postindustrial. Many developing countries are still in the transitional stage. Analysts fear that these developing countries may become caught in a demographic trap, with population growth outstripping economic growth and resulting in a depletion of natural capital.
8. India and China have both made efforts to control their population growth. China has been more successful because, as a dictatorship, it has imposed restrictions on family size, with rewards and punishments for those who support or defy the government's direction. India, without a policy of coercion, has reduced its birth rate somewhat, but the desire for males, as well as the desire for several children to provide care for old parents, has maintained a growing population.
9. The most effective method to slow the growth of world population is to invest in family planning, reduce poverty, and elevate the status of women.

## **Key Concepts and Learning Outcomes**

After completing this chapter, students should be able to answer the following key questions.

### ***10-1 What Is Demography, and Why Is It Important? How Population Change Affects Life, Death, and Economies***

A. Demography is the study of the size, composition, and distribution of human populations, and also the causes and consequences of changes in these characteristics.

### ***10-2 How Is Population Size Affected by Birth Rates and Death Rates? Entrances and Exits***

A. Population increases through births and immigration and decreases through deaths and emigration. [population change = (Births + Immigration) – (Deaths + Emigration)]

1. The crude birth rate is the number of live births per 1000 people in a population in a specific year.
2. The crude death rate is the number of deaths per 1000 people in a population in a specific year.

### ***10-3 How Fast Is the World's Population Growing? Good and Bad News***

A. The population growth rate has slowed, but global population is still increasing rapidly.

1. The annual rate of natural population change (%) equals birth rate minus death rate divided by 1000 persons multiplied by 100.
2. The rate of the world's population growth has decreased.
3. The annual population growth dropped by almost 50% between 1963 and 2014: from 2.2% to 1.2%. During this same period, the population base doubled to 7.2 billion.
4. There is a large difference in the exponential population growth rates of developed and developing countries, with developed countries growing at 0.1% in 2014 and developing countries growing at 1.5% (15 times faster).
5. The populations of China and India comprise 37% of the world's population.
6. The next most populated country is the United States, with 4.4% of the world's population.

### ***10-4 How Long Does It Take to Double the Number of People on the Planet? The Rule of 70***

A. Doubling time is one measure of population growth. The rule of 70 is a quick way to calculate doubling time in years. If the population grows by 1.2% in 2014, divide 70 by 1.2, which equals 58 years.

### ***10-5 How Have Global Fertility Rates Changed? Having Fewer Babies per Woman***

A. Fertility is the number of births that occur to an individual woman in a population.

1. Changing fertility rates affect population growth.
  - a. Replacement-level fertility is the number of children needed to replace their parents (2.1 in developed countries and as high as 2.5 in developing countries).
  - b. Total fertility rate (TFR) is the average number of children that a woman has during her fertile years.
2. There are apt to be 7.8 to 10.8 billion people by 2050. Ninety-seven percent of population growth is projected to take place in developing countries where acute poverty is a way of life for about 1.4 billion people.

### ***10-6 What Factors Affect Birth Rates and Fertility Rates? Reducing Births***

A. Many factors influence birth and fertility rates.

1. Many children work in developing countries, and they are important to the labour force.
2. The economic cost of raising and educating children determines their numbers. The more it costs to have children, the fewer children people tend to have.
3. Where private and public pension systems are available, adults have fewer children because they don't need children to take care of them in old age.
4. People in urban areas, as compared to rural areas, usually have better access to family planning, so they have fewer children.
5. If women have educational and economic choices, they tend to have fewer children.
6. When the infant mortality rate is low, people have fewer children because children are not being lost to death.
7. The older a woman is when she marries, the fewer children she has.
8. If abortions are available and legal, women have fewer children.
9. The availability of reliable birth control allows women to space children and determines the number of children they bear.

### **10-7 What Factors Affect Death Rates? Reducing Deaths**

- A. Factors that have caused a decline in death rates are the following.
1. Better food supplies, better nutrition, and safer water supplies contribute to people living longer.
  2. Advances in medicine and public health, and improved sanitation and personal hygiene, contribute to people living longer.
  3. Measures of overall health include the following.
    - a. Life expectancy is the average number of years a newborn can be expected to live.
    - b. Infant mortality rate is the number of babies out of every 1000 born who die before their first birthday.
      - 1) This rate reflects a country's level of nutrition and health care.
      - 2) It is the single best measure of a society's quality of life.
  4. Between 1965 and 2013, the infant mortality rate fell
    - a. from 20 per 1000 live births to 5 in developed countries, and
    - b. from 118 to 42 in developing countries.
  5. In Canada between 1900 and 2013, infant mortality rate declined from 140 to 4.8 per 1000 births.

### **10-8 Is Population Growth in Canada Slowing or Increasing? Some Projections**

- A. Population growth in Canada is summarized as follows:
1. The Aboriginal population was 300 000 before European contact and 60 000 after contact.
  2. Earliest immigrants were primarily British and French
  3. Relative to the overall population of Canada, the populations of the Maritime provinces and Quebec have decreased since 1900 and have increased in British Columbia and the Prairie provinces.
  4. The Canadian total fertility rate was 1.6 in 2013.
  5. Immigration supplies two-thirds of the population growth.
  6. The population is aging; in 2031, 25% of the population will be 65 or older.
  7. If fertility and immigration trends remain constant, the population will stabilize at about 50 million.
  8. The Aboriginal population is growing twice as fast as the rest of the population.

### **10-9 What Are Age Structure Diagrams? Sorting People by Age Groups**

- A. Age structure diagrams are visual aids, showing the distribution of males and females in each age group.
- B. The rate of population growth or decline is determined by the proportion of the population in the young, middle, and older age groups.
1. The percentages of males and females in the total population are divided into the following age categories.

- a. Pre-reproductive ages span from birth to 14 years of age.
- b. Reproductive ages include 15 through 44.
- c. Post-reproductive ages include 45 and up.

**10-10 How Does Age Structure Affect Population Growth? Teenagers Are the Population Wave of the Future**

- A. The major determining factor in a country's future population growth is the number of people under the age of 15.
1. In 2013, 26% of the planet's population was under 15.
  2. The world is demographically divided. In developing countries, 29% are under 15; this is approximately twice as many as in developed countries.

**10-11 How Do the Canadian and U.S. Populations Compare? Similar, but Not the Same**

- A. Populations in Canada and the United States are growing at similar rates, and following World War II, there was a baby boom in both countries.
1. The population of the United States is 10 times larger than the Canadian population, but most Canadians live within 160 kilometres of the Canada-U.S. border.
    - a. Air and water pollution is high in these areas.
    - b. There are many more wilderness areas in Canada than in the United States.

**10-12 How Can Age Structure Diagrams Be Used to Make Population and Economic Projections? Looking into a Crystal Ball**

- A. Changes in the distribution of a country's age groups have long-lasting economic and social impacts.
1. An example of this is the baby boom generation in Canada and the United States.
    - a. Such a group can dominate the population's demands for goods and services.
    - b. They influence elections, legislation, and economic demand.
    - c. Retirement of baby boomers in North America may create a shortage of workers.
      - 1) The "baby bust" generation (born between 1965 and 1976) will have to support a large number of retired baby boomers.
      - 2) There will be fewer people to compete for education, jobs, and services.
      - 3) Too few people in the labour force may increase wages.
  2. It may be more difficult to get job promotions because a larger baby boom group will occupy most upper-level positions.
  3. There is an echo-boom consisting of people born since 1977.
  4. These fluctuations in population age structure have social and economic effects for decades.

**10-13 What Are Some Effects of Population Decline from Reduced Fertility? Sliding Down a Hill Too Fast Can Hurt**

- A. Reduced fertility and population decline can have long-term consequences, especially if the decline is rapid.
1. A gradual population decline and its harmful effects can usually be managed.
  2. Rapid population declines can lead to a sharp rise in the proportion of older people and result in
    - a. a sharp rise in public services and the cost for health, and
    - b. fewer working taxpayers and labour shortages.
    - c. It may be necessary to introduce generally unpopular moves (e.g., raise retirement age, raise taxes, cut retirement benefits, and increase legal immigration).

**10-14 What Are Some Effects of Population Decline from a Rise in Death Rates? The AIDS Tragedy**

- A. When populations decline because of deaths, the consequences are serious.
1. Deaths from disease, such as AIDS, disrupt a country's social and economic structure.

2. Large numbers of people at a particular age are removed from the country's future.
  - a. Life expectancy drops.
  - b. In the case of AIDS, the deaths are mostly young adults.
  - c. Two major goals are to reduce the spread of HIV through education and health care, and to provide financial help for education, health care, volunteer teachers, and social workers.

**10-15 What Are the Advantages and Disadvantages of Reducing Births? An Important Controversy**

- A. Can the world sustain a rising population without causing widespread environmental damage?
  1. More consumers = more growth; people are the world's resource as consumers and as problem solvers.
  2. Some analysts feel that we should aim to achieve the optimum sustainable population.
  3. Some feel that limiting population is a violation of their religious beliefs.
  4. The world is already overpopulated.
    - a. Basic necessities of life are not provided for one out of six people today.
    - b. Declining health and environmental conditions threaten the entire world.
    - c. Increased resource use and environmental harm compromises the health of the environment through infectious disease, biodiversity loss, fisheries depletion, water scarcity, pollution, and climate change.
    - d. To maintain the quality of life on Earth for all people requires that some limits be placed on everyone.

**10-16 How Can Economic Development Help Reduce Birth Rates? Economics Worked Once but Will It Work Again?**

- A. The demographic transition hypothesis states that as countries industrialize, first the death rate declines, and then the birth rate declines in four stages.
  1. The preindustrial stage produces high birth and death rates because living conditions are harsh.
  2. The transitional stage sees food production rise, and there are improvements in health care. Death rates drop, and birth rates remain high.
  3. In the industrial stage, the birth rate begins to decrease, and the death rate also decreases because of industrialization and medical advances. Modernization is widespread.
  4. In the postindustrial stage, the birth rate equals the death rate, resulting in zero population growth. The population size begins to slowly decrease.
  5. Some countries run the risk of being caught in the transitional state, and economic conditions will not be available to sustain the population (a demographic trap).
    - a. There can be a shortage of skilled workers to sustain the country's economy.
    - b. There will not be capital and resources to support rapidly developing economies.
      - 1) International debt takes much of a country's resources.
      - 2) Developed countries are not helping developing countries economically.

**10-17 How Can Family Planning Help Reduce Birth and Abortion Rates and Save Lives? Planning for Babies Works**

- A. Family planning helps reduce the number of births and abortions throughout the world.
  1. Information is provided on birth spacing, birth control, and health care.
  2. Family planning has been responsible for at least 55% of the drop in the total fertility rate in developing countries.
  3. Family planning has also reduced the number of legal and illegal abortions per year.
  4. Services come through educational and clinical services.

- a. Almost 42% of the pregnancies in developing countries are unplanned, and 26% end in abortion.
- b. Women want to limit their pregnancies but have no access to contraceptives.
5. Family planning success can be improved through the following methods:
  - a. Targeting programs to teenagers and unmarried, sexually active women
  - b. Developing programs for educating men about their responsibilities for the children they father
  - c. Providing more effective means of birth control for men
  - d. Advocating that pro-choice and pro-life groups join forces to reduce unplanned birth and abortions

**10-18 How Can Empowering Women Help Reduce Birth Rates? Ensuring Education, Jobs, and Rights**

- A. Empower women by providing education, paying jobs, and supporting their human rights.
1. Women work two-thirds of all the hours worked, but receive 10% of the world's income.
  2. Empowering women would slow population growth, promote human rights, reduce poverty, and slow environmental degradation.
  3. Reducing population growth can best be achieved by investing in family planning, reducing poverty, and elevating the status of women.

**10-19 What Success Has India Had in Controlling Its Population Growth? Some Progress but Not Enough**

- A. India has tried to control its population growth for years.
1. The overpopulation ills of poverty, malnutrition, and environmental problems abound in India.
    - a. Almost one-half of India's labour force is unemployed.
    - b. Half of its cropland is degraded due to soil erosion.
    - c. Two-thirds of its water is seriously polluted, with inadequate sanitation services.
  2. Efforts to limit population have not been especially successful because
    - a. poor couples believe they need several children for work and care, and
    - b. there is a strong preference for male children, so many do not use birth control.

**10-20 What Success Has China Had in Controlling Its Population Growth? Good Progress, Enforced with an Iron Hand**

- A. Population growth in China has been controlled by a strongly enforced government program.
1. Between 1972 and 2013, China's birthrate was cut in half.
  2. Couples with one child are rewarded with extra food, larger pensions, better housing, bonuses, free school tuition, and preferential employment treatment for the child.
  3. About 85% of married women use modern contraception, provided free by the government.
  4. China's population has an enormous environmental impact that may affect its production of food.
  5. Health clinics that formerly provided basic health care for rural farm populations collapsed in the 1980s; now 9 out of 10 rural Chinese have no health insurance or social safety net.

**10-21 What Can We Do to Slow Population Growth? New Visions**

- A. At the 1994 U.N. Conference on Population and Development held in Cairo, 179 countries committed to taking action on human reproduction, sustainable development, and economic development.
1. The following goals of the "Cairo Consensus" were to be implemented by 2015.

- a. Provide universal access to family planning services and reproductive health care.
  - b. Improve health care for infants, children, and pregnant women.
  - c. Develop and implement national population policies.
  - d. Provide more education, especially for girls and women.
  - e. Improve the status of women, and expand education and job opportunities for young women.
  - f. Increase the involvement of men in child-rearing responsibilities and family planning.
  - g. Sharply reduce poverty.
  - h. Greatly reduce unsustainable patterns of production and consumption.
2. Momentum on reducing population growth increased prior to the Millennium Summit in September 2000, which led to the development of Millennium Development (MD) Goals.
  3. Half of the MD goals apply to population-related issues. These goals are as follows:
    - a. Achieve universal primary education.
    - b. Promote gender equality and empower women.
    - c. Reduce child mortality.
    - d. Improve maternal health.