



Chapter 9 Applying Population Ecology: The Human Population and It's Impact



“It’s A Small World After All”

Outline

Human Population Growth: A Brief History

- A. The human population has grown rapidly due to technology, improved medical techniques, emphasis on hygiene, and expansion of agriculture and industry.
- B. Population growth has slowed but is troubling because we do not know how long we can continue without overshooting earth’s carrying capacity for humans.
- C. No population, including humans, can continue to grow indefinitely.

Factors Affecting Human Population Size

- 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 1,000 people in a population in a specific year.
 2. The crude death rate is the number of deaths per 1,000 people in a population in a specific year.
- B. There are currently more births than deaths throughout the world.
 1. The annual rate of natural population change (%) = birth rate- death rate divided by 1,000 persons multiplied by 100.
 2. The rate of the world’s population growth has decreased.
 3. The annual population growth dropped by almost half between 1963 and 2004, from 2.2% to 1.2%. But during this same period, the population base doubled from 3.2 to 6.4 billion.
 4. There is a big difference in the exponential population growth rates of developed and developing countries with developed countries growing at 0.25% and developing countries growing at 1.46% - almost six times faster.
 5. The six fastest growing countries in terms of population are India, China, Pakistan, Nigeria, Bangladesh, and Indonesia.
- C. The populations of China and India comprise 37% of the world’s population. The next most populated country is the United States with 4.5% of the world’s population.
- D. Fertility is the number of births that occur to an individual woman or in a population.
 1. The changing nature of fertility rates effect 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.
 2. There are apt to be between 7.2 – 10.6 billion people by 2050, with 97% of this growth to be in developing countries. These countries have acute poverty as a way of life for about 1.4 billion people.
- E. From 1946-1964 the United States had a sharp rise in birth rate, called the baby-boom period.
 1. At its peak the TFR reached 3.7 children per woman. There has been a gradual decline since then.
 2. The population growth of the United States is still greater than any other developed country and is not close to leveling off.
 3. About 2.7 million people were added to the U.S. population in 2004. Fifty-five percent of this population growth comes from more births than deaths and 45% comes from immigration.
 - a. Other major developed countries have slower population growth and most are expected to have declining populations after 2010.
 - b. The high US per capita resource rate use produces enormous environmental impact.
- F. 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. The more children cost, the less children people tend to have.
 3. If there are available private/public pension systems, adults have fewer children because they don’t need children to take care of them in old age.

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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. When the infant mortality rate is low, people have fewer children because children are not being lost to death.
 7. The older the age, at which women marry, the fewer children they bear.
 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.
- H. Factors, which have caused a decline in death rates, are the following:
1. Better food supplies and nutrition and safer water supplies contribute to people’s living longer.
 2. Advances in medicine and public health, improved sanitation and personal hygiene also contribute to people’s living longer.
- I. Measures of overall health are:
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.
 3. US infant mortality rate is higher than 35 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.
- J. Arguments to limit immigration into the U.S. are:
1. Limitations would aid in stabilizing the population sooner.
 2. Limitations would help reduce the US’s enormous environmental impact.
- K. Arguments for generous immigration policies in the U.S. are:
1. Historically, the U. S. has been the land of opportunity for the world’s poor.
 2. Immigrants do work that Americans won’t do or handle jobs for which there are not enough trained natives.
 3. Immigrants contribute to the economy and pay taxes.

Population Age Structure

What are age structure diagrams? They are visual aids, which show the distribution of males and females in each age group.

- A. The percentages of male 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 15 through 44.
 3. Post-reproductive ages include ages 45 and up.
- B. The major determining factor in a country’s future population growth is the number of people under the age of 15.
1. In 2004, 30% of the planet’s population was under 15.
 2. The world is demographically divided.
- C. 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.
1. Such a group can dominate the population’s demands for goods and services.
 2. They influence elections and legislation and economic demand.
 3. Retirement of baby boomers in the U.S may create a shortage of workers.
- D. The ‘baby bust’ generation compared to that of the ‘baby boom’.
1. There will be fewer people to compete for education, jobs, and services.
 2. Too few people in the labor force may increase wages.
 3. It may be more difficult to get job promotions because a larger baby-boom group will occupy most upper-level positions.
 4. There is an echo-boom consisting of people born since 1977.
 5. These fluctuations in population age structure have social and economic effects for decades.

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- E. Reduced fertility and 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 services’ cost for health, etc.
 - b. May have many fewer working taxpayers & 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 number 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.

Solutions: Influencing Population Size

- A. Can the world sustain a rising population without causing widespread environmental damage?
1. More consumers = more growth, and people are the world’s resource as consumers and as problem solvers.
 2. Some feel that limiting population is a violation of their religious beliefs.
 3. 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 will threaten the entire world.
 - c. Increased resources use and environmental harm is compromising the life of the environment through: infectious disease, biodiversity loss, fisheries depletion, water scarcity, pollution, and climate change.
 - d. The quality of life on the planet and for all its people requires some limits on everyone.
- B. The demographic transition hypothesis states that as countries become industrialized, first their death rates and then their birth rates decline in four stages.
1. The pre-industrial stage produces high birth and death rates because living conditions are harsh.
 2. The transitional state sees food production rise and improvement in health care. Death rates drop and birth rates remain high.
 3. The industrial stage causes the birth rate to begin to drop and the death rate drops because of industrialization, medical advances and modernization are widespread.
 4. The postindustrial stage moves to the birth rate equaling the death rate and resulting in zero population growth. Population size will begin slowly decreasing.
- C. Some countries run the risk of getting caught in the transitional state and economic conditions will not be available to sustain the population.
1. There can be a shortage of skilled workers to sustain the country’s economy.
 2. There will not be capital and resources to support rapid developing economies.
 - a. International debt takes much of a country’s resources.
 - b. Developed countries are not helping developing countries economically.
- D. Family planning helps reduce the number of births and abortions throughout the world.
1. Information is given on birth spacing, birth control, and health care.
 2. Family planning has been responsible for at least 55% of the drop in TFRs in developing countries.
 3. Family planning has also reduced both legal and illegal abortions per year.
 4. Services come through educational and clinical services.
 - a. Almost one-half of pregnancies in developing countries are unplanned and 26% end in abortion.
 - b. Women want to limit their pregnancies but have no access to contraceptives.

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5. Family planning success can be improved through these methods:
 - a. Target programs to teenagers and unmarried, sexually active women.
 - b. Develop programs for educating men about their responsibilities for the children they father.
 - c. Provide more effective means of birth control for men.
 - d. Advocate that pro-choice and pro-life groups join to reduce unplanned birth and abortions.
6. Empower women by providing education, paying jobs, and support their human rights.
 - a. Women work two-thirds of all the hours worked, but receive 10% of the world’s income.
 - b. Empowering women with these things would slow population growth, promote human rights, reduce poverty and slow environmental degradation.
- E. Reducing population growth can best be achieved by investing in family planning, in reducing poverty, and elevating the status of women.

Slowing Population Growth in India and China

- A. India has tried to control its population growth for years.
 1. Overpopulation ills of poverty, malnutrition, and environmental problems abound in India.
 2. Almost one-half of India’s labor force is unemployed; half of its cropland is degraded due to soil erosion; 2/3s of its water is seriously polluted, with inadequate sanitation services.
 3. Efforts to limit population have not been especially successful because:
 - a. Poor couples believe they need several children for work and care.
 - b. There is a strong preference for male children so many do not use birth control.
- B. Population growth in China has been controlled by a strongly enforced government program.
 1. Between 1972-2004, 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. 83% 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. The health clinics that used to provide basic health care for rural farm population collapsed in the 1980s, now 9 of 10 rural Chinese have no health insurance or social safety net

Human Impacts on Natural Systems

- A. Humans have altered nature in ways that threaten the survival of many species including our own species.
 1. Humans have directly affected changes on about 83% of earth’s land surface.
 2. Humans have altered nature to meet needs and wants in nine major ways.
 - a. Destruction, fragmentation, and degrading of wildlife habitats have reduced biodiversity.
 - b. The simplification and homogenization of natural ecosystems by clearing land and planting a single species (monoculture) reduces numbers of species and interactions.
 3. Alteration of natural ecosystems needs to be slowed down and we need to maintain a balance between simplified, human-altered ecosystems and more complex natural ecosystems.
- B. By learning how the earth works and work with its natural processes, we can increase our own quality of life.

Summary

1. Birth, death, fertility, and migration rates are the factors that determine population size. As birth rates have declined in developed countries, population has increased due to people’s migrating into these countries. Women’s fertility rates have dropped but are still above the replacement-level fertility around the world.
2. Population size is profoundly affected by age structure. If women are past their primary child-bearing ages, population increase will be limited. If, however, the population has a large percentage of young women entering their childbearing years, the potential for large population increases is present. In general, the closer a country’s young women are to 15-40 years of age, the more potential for a

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rapidly increasing population.

3. We can influence population size by encouraging smaller families, by encouraging adoption of children already born and discouraging new births. Population size is, also, affected by health care or its lack; by epidemics (such as AIDS); by losses through war, etc. Lack of prenatal care for expectant mothers, failure to protect children from communicable diseases (like measles) or wide-spread diseases (like malaria) can contribute to a smaller population. In the past economic development, family planning, and economic opportunities for women have reduced birth rates.
4. 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; but the wish for male children and several children for the care of old parents have helped to maintain a growing population.
5. 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.

Objectives

1. Define *birth rate*, *death rate*, *emigration rate*, and *immigration rate*. Write an equation to mathematically describe the relationship between these rates and the rate of population change.
2. Distinguish between replacement-level fertility and total fertility rate. Describe how total fertility rate affects population growth. List at least five factors that affect birth and fertility rates and five factors that affect death rate.
3. Summarize changes over time in the U.S. population growth rate. Give reasons for the high rate of teen pregnancy in the United States compared to the rate in other industrialized countries. Draw connections between population growth and environmental degradation in California.
4. Define *infant mortality rate*. Explain why it is considered a good indicator of quality of life.
5. Compare rates of population growth in developed countries and developing countries. Explain the differences you find.
6. Using population age structure diagrams, explain how the age structure of a country creates population growth momentum. Summarize problems associated with a baby boom and a declining population.
7. Summarize key factors used to influence population size: immigration policy, family planning, economic rewards and penalties, empowering women. Summarize the current attitudes toward immigration policy in the United States.
8. List the four stages of the demographic transition. List social, biological, political, and economic issues that can be addressed to help developing countries undergo a demographic transition. List three factors that may limit the effectiveness of a demographic transition in influencing population size.
9. Compare and evaluate the population policies of India and China. Summarize what we have learned from decades of trying to influence human population growth. List the major goals of the UN Conference on Population and Development.

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Key Terms (Terms are listed in the same font style as they appear in the text.)

age structure (p. 178) <i>baby-boom period</i> (p. 175) birth rate (p. 173) crude birth rate (p. 173) crude death rate (p. 174) <i>cultural carrying capacity</i> (p. 173) death rate (p. 174) demographic transition (p. 182) <i>demographic trap</i> (p. 183) <i>demographically divided world</i> (p. 179) migration (p. 177) <i>mortality</i> (p. 173) <i>optimum sustainable population</i> (p. 173) population change (p. 173) <i>postindustrial stage</i> (p. 183) <i>postreproductive</i> (p. 178) <i>preindustrial stage</i> (p. 183)	<i>emigration</i> (p. 177) family planning (p. 184) <i>fertility</i> (p. 173) fertility (p. 174) <i>gender imbalance</i> (p. 187) <i>immigration</i> (p. 177) <i>industrial stage</i> (p. 183) infant mortality rate (p. 177) life expectancy (p. 177) <i>migration</i> (p. 173) <i>prereproductive</i> (p. 178) replacement-level fertility (p. 174) <i>reproductive</i> (p. 178) total fertility rate (TFR) (p. 174) <i>transitional stage</i> (p. 183) <i>urbanization</i> (p. 176)
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