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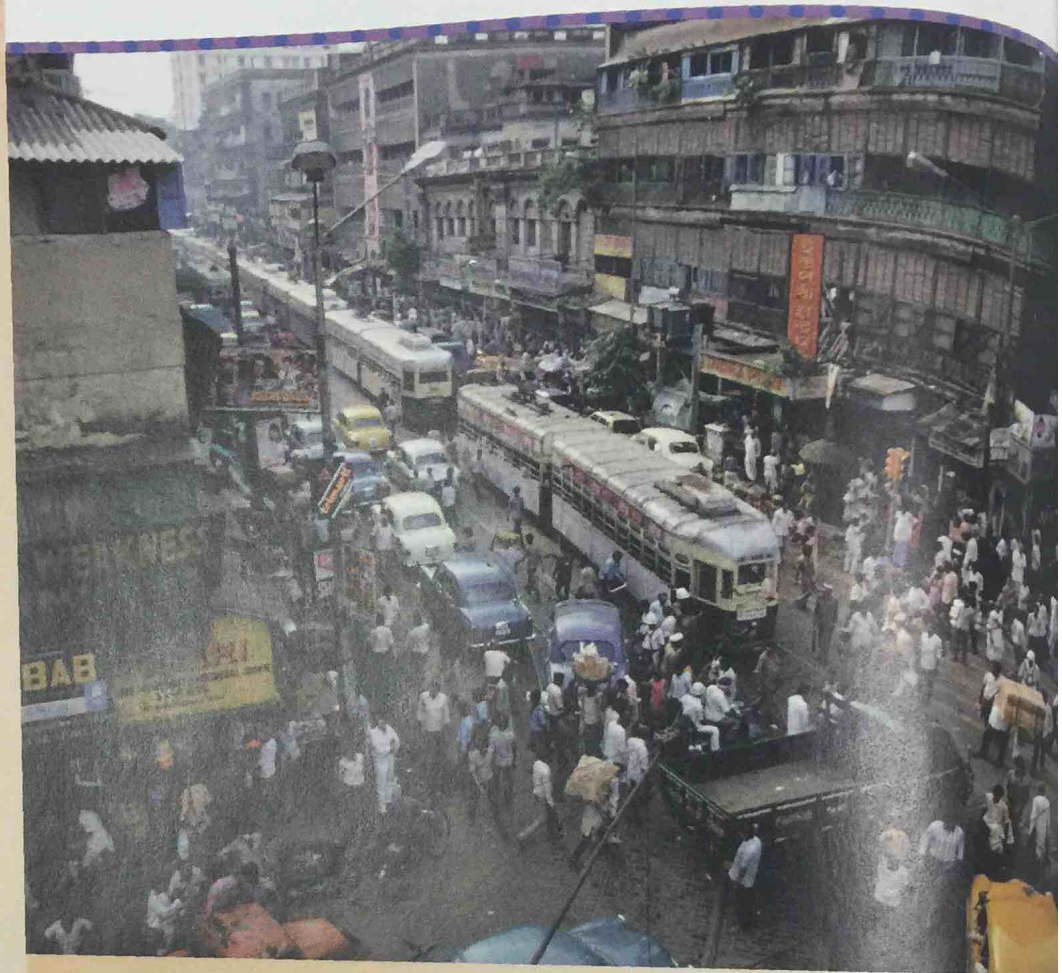
Population: Canada and the World

FOCUS ON

- What is meant by demographics and population geography?
- What are the components and nature of population change?
- How do fertility, mortality, and migration influence populations?
- What role do population structures and characteristics play in population change?
- What is the difference between population distribution and density?
- How will present rates of world population growth affect our future?
- What problems are associated with population growth?

Counterpoints Issue

- What are the limits of population growth?



This 1990s photograph shows a crowded street in Calcutta, India. In May 2000, India officially recognized a baby girl as Baby One Billion. With thirty babies being born every minute, India's population will overtake China's current population of more than 1.3 billion between 2012 and 2015. This will make India the world's most populous nation.



Expressing ideas What are your impressions of this scene in terms of the impacts of population growth? What features tell you that this is not a photograph of a Canadian city?

Introduction

In 1999, the United Nations declared that the world's population had reached six billion people. Forecasters are sure that at least another billion will be added by the year 2020. Does this milestone mark another step towards approaching doom? Some people see the growth in population as a contributor to shortages in energy, housing, and food, and to an increase in pollution, unemployment, and the destruction of the environment. The question these people pose is: At what point will the world's resources fail to support its population?

Others scoff at such a doomsday scenario. According to these optimists, world population will increase to nine billion in 2054 and level off at ten billion after 2100. By then, they predict, technology will have found ways to provide for the increased numbers of people.

Both sides find hope and despair in the United Nations' projections. Neither side thinks the population problem is over. In this chapter, you will have the opportunity to develop your own points of view on this issue.

World Population Growth

Two thousand years ago, there were about 300 million people on Earth. In 1804, there were one billion. From that point on, the rate of increase began to accelerate. The twentieth century began with world population under two billion people and ended with triple that number. Between 8000 BCE and AD 1750, about 70 000 people each year were added to the Earth's population. Today that number is added in less than seven hours. This rate of increase is of greater concern than the numbers themselves.

It is difficult to grasp the difference between large numbers like a million and a billion. How do we understand the difference in size of population between India at one billion and Fiji at nearly one million, or China at 1.2 billion and Gabon in Africa at 1.2 million? It might help to understand these numbers by noting that you had lived a *million* seconds when you were 11.6 days

World Population	When Reached?	How Long to Reach?
1 billion	1804	Human history to this date
2 billion	1927	123 years
3 billion	1960	30 years
4 billion	1974	14 years
5 billion	1987	13 years
6 billion	1999	12 years
United Nations' Estimates of Future Growth		
7 billion	2013	14 years
8 billion	2028	15 years
9 billion	2054	26 years
10 billion	2100	46 years

Source: United Nations, *World Population Projections, The 1998 Revision*. Adapted from Population Reference Bureau, *Population Bulletin*, 54(1), 1.

Figure 13-1 World population growth.

Making a graph Make a line graph of the actual growth in population from 1804 to 1999 and the four estimates for 2013 to 2100. Then, brainstorm reasons for (a) the rapid growth in the twentieth century, (b) reasons for the different U.N. estimates, and (c) the possible consequences of rapid growth.

old. You won't be a *billion* seconds old until you are 31.7 years of age.

Demography

Demography is the statistical study of human populations. It helps us to understand the causes and consequences of population change. Population change in your community, in Canada, and in the world is an ongoing concern to agencies such as government and business. All levels of government need accurate figures of population change so that they can plan for such things as the numbers of schools and classrooms that are needed. Businesses are interested in information about family size, incomes, and consumer habits as they plan their marketing strategies.

The Census: Counting People

The most complete way to gather information about population is to conduct a population **census**. Censuses go back to the ancient civilizations of Egypt and Rome. Early censuses allowed rulers to determine the number of people under their rule and to identify taxpayers, potential labourers, and soldiers. Today, according to the United Nations, a census of population is the “total process of collecting, compiling, and publishing demographic, economic, and social data pertaining to a particular time, to all persons in a particular country.”

Since Confederation in 1867, Canada has had a major census every ten years in the first year after the end of each decade and a less detailed one every five years. The census provides a picture for that day of the Canadian population. Statistics Canada collects detailed information on population numbers and population characteristics such as age and education. All Canadians are required by law to be counted in the census. A selection of people has to give more detailed information about their accommodation, household contents, income, buying habits, and so on.

As well, hundreds of other interested groups carry out surveys. These are used to find out about and predict such things as market trends, television viewing patterns, and voting preferences. Governments and businesses are reluctant to make

important decisions without first checking survey results. All this information, together with health, scholastic, and job-related statistics, amounts to a major demographic file on every Canadian. The accumulation of data about the population has become so detailed that most governments now have a privacy commissioner to make sure that confidential information remains that way.

Demographic figures on countries must be accepted with caution. A **developed country** like Canada has the resources to keep its data current, yet its figures will still have a margin for error. For example, it is difficult to make sure that all street people are counted. In **developing countries**, the census data are usually much less accurate because the registration of births and deaths is not as complete as in developed countries. Census takers may not be able to reach remote areas. People in shanty towns are not counted because they are not considered permanent residents of cities. Further, some people may avoid census takers out of fear of authorities, the wish to avoid taxation, or conflicts with governments over population policies.

Making comparisons between countries for such things as literacy or the size of an urban location can be difficult, as definitions may differ. Published numbers of people in fast-growing cities can often vary widely. Figures may be outdated, especially if a country has not held a recent census.

Figure 13-2 A census representative explains the 1996 census form to a householder in Mount Pearl, Newfoundland.

Thinking critically Why is the census taker wearing identification? Suggest four important characteristics required of a census taker.



Until recently, researchers could not easily access accurate and up-to-date data on population. Often, statistical data on populations published by the United Nations and Statistics Canada were available at only the biggest libraries, and even these did not always have the most up-to-date publications.

The Internet has made it easier to find up-to-date Canadian and world population statistics. However, this resource should be used with care. Some Web sites may not be reliable sources of information. Because there is no agency to control what is put on the Internet, you must be selective in those sites you choose to use, and all content must be approached with caution.

Steps in Evaluating Web Sites

1. *Authority* — Are the authors or producers of the material clearly identified, and do they have expertise in the subject area?
2. *Accuracy* — Are sources of information given?
3. *Bias* — Is the author or producer an advocate of a particular viewpoint? Is more than one point of view presented? Are facts and opinions clearly distinguished?
4. *Coverage* — Are there areas that are not covered that you need to know?
5. *Currency* — Is the information up to date? Are the links to other sites current?
6. *Usability* — Can you understand the material?

What should you do when you find widely different information? For example, the population of Mexico City given in three reliable on-line sources in 1999 varied widely: the United Nations set it at fifteen million, the U.S. Department of State at twenty-one million, and the World Book Encyclopedia at a high of twenty-six million. So, which figure do you accept? The best advice is to check the source against the steps listed above, and accept the figure that seems to come from

the most reliable source. Be sure to quote your source when you use the information.

The following three Web sites are credible sources of particular interest to people studying demographics.

- The United Nations Web site has data from many countries in a variety of formats.

www.unicef.org

- The Web site for Statistics Canada gives you access to a wealth of data on Canada's population.

www.statcan.ca

- For a world perspective, the U.S. Census Web site has links to population statistics for various countries. It has population pyramids for most countries for various dates.

www.census.gov/ftp/pub/ipc

Bookmark these sites and begin a file of sources on population geography and demography.

Applying the Skill

1. As a group, search for Web sites with population statistics. Rate the sites as good, fair, or poor based on the evaluation checklist above. Share your findings with the class, and compile a list of "good" sites.
2. Search for population data for a country of your choice on several Web sites. Compare the results of your search with those of your classmates. Account for any variations you may find.
3. With a partner, develop a visually appealing, humorous, single-page poster warning of the dangers awaiting "population number crunchers" on the Internet.
4. As a group, plan the contents of a Web site called "Census Sense" (or choose your own title). Have each member contribute information on the history of Canada's census, advantages and drawbacks of census taking, population numbers from the most recent census, and examples of censuses from other countries.

Population Rates—Go Figure!

Demographers are most interested in statistics that help them predict and explain changes in society. For instance, the number of working women in a society will have an effect on the birth rate. It may also influence the diet of families, increasing the amount of packaged and pre-prepared foods they eat.

The components of population change are:

- how many people are born,
- how many die, and
- how many move in or out of an area.

Expressed in an equation, these are:

$$\text{Births} - \text{deaths} + \text{immigrants} - \text{emigrants} = \text{increase or decrease in population}$$

It is not very useful to compare births and deaths of countries that have widely differing population sizes. To know that each day slightly more than 1000 children are born in Canada, 4200 in India, and ninety-four in Gabon is not very useful unless the total populations of the countries are considered. What really matters is comparing the relationship between the number of births and the size of the population in each country. Demographers do this by using measurements called *birth rates* and *death rates*.

Demographers use rates per thousand when figuring population change. The **crude birth rate** is calculated by dividing the number of births in one year by the population and then multiplying the result by 1000. The same method is used to calculate the **crude death rate**. Subtracting deaths from births gives the rate of **natural increase**.

Canada's annual crude birth rate is about eleven per thousand, and the crude death rate is about seven per thousand. The natural increase of the Canadian population for a given year is six per thousand. This is usually expressed as 0.6 per cent. This figure does not include the increase that comes from immigrants. In countries like Gabon, where there are few immigrants, the annual growth rate of 1.5 per cent is made up entirely of natural increase.

Country	Population	Births per 1000 per Year	Birth Rate (%)
India	982 223 000	25	2.5
Russia	147 434 000	10	1.0
Canada	30 563 000	11	1.1
Gabon	1 167 000	37	3.7

Figure 13-3 Comparing birth rates of selected countries, 1999.

Interpreting statistics Calculate the approximate number of births for 1999 for each country by multiplying the total population by the percentage birth rate, and dividing the answers by 100. How would this information allow you to predict the population in 2000?

The Rule of Seventy

Human populations have the potential to grow at an ever-increasing rate. Suppose that a couple has four children, and each of these grows up to produce four children. By the third generation the couple will have sixteen descendants. This is called an **exponential rate** of increase. A regular arithmetic rate of 1, 2, 3, 4, and so on is quickly overtaken by an exponential rate which increases by 1, 2, 4, 8. Each generation builds on previous generations in a compound fashion.

A convenient way to express exponential population growth is to use the length of time it would take for a population to double in size. One way of calculating this is to apply the "rule of seventy," which states that **doubling time** is approximately equal to seventy divided by the growth rate (in per cent) per year. For example, Gabon at the present rate of natural increase has a doubling time of approximately forty-seven years:

$$70 \text{ divided by } 1.5 \text{ (per cent growth per year)} = 46.7 \text{ years}$$

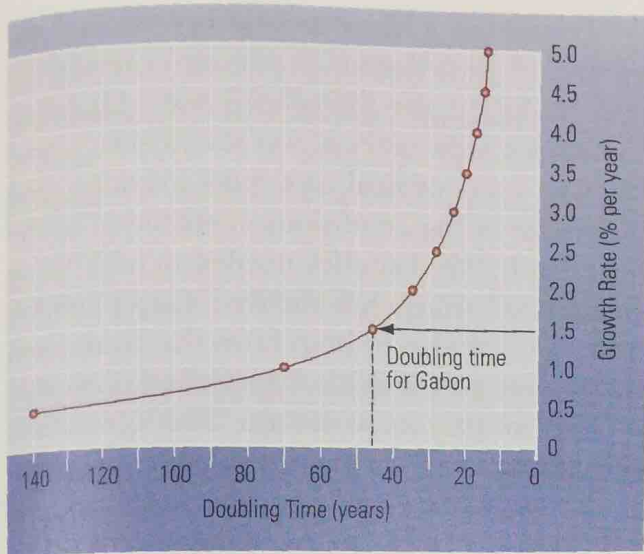


Figure 13-4 Population growth rate and doubling times.

Reading a graph Canada's rate of natural increase is -0.6 per cent. How many years would it take Canada's population to double if we did not take in immigrants?

The Effect of Migrations

Population increase in some countries, particularly Canada, depends on immigrants. As well, emigrants leave the country each year, which affects the demography. The **immigration rates** and **emigration rates** are calculated in a similar manner to birth and death rates. The difference between the two gives the **net migration rate**. Net migration rate is given as a rate per thousand. A combination of the birth rate, the death rate, and the net migration rate gives a complete picture of the annual change in the Canadian population:

$$\text{Birth Rate} - \text{Death Rate} \pm$$

(BR) (DR)

$$\text{Net Migration Rate} =$$

(NMR)

$$\text{Population Growth Rate}$$

Canada, the United States, and Australia are some of the few countries in which immigration is a significant factor in the growth of their populations. Most immigrants to Canada come as economic migrants from developing nations, wanting to better their standard of living. Others come as



Figure 13-5 The differing circumstances of migrants. Top: These illegal Chinese migrants await immigration processing after being dumped off the coast of British Columbia in 1999. In spite of the perils of the journey, many Chinese are attracted by the promise of improved living standards in the land of the "Golden Mountain."

Bottom: Displaced women line up at a food distribution centre in western Ethiopia. The drought and famine that struck the east African country in the late 1990s caused many people to migrate in search of food, water, and other essentials of life.

refugees seeking to escape persecution in their home country.

Large-scale mass migrations affect the structure of population by age and sex. Most immigrants are young and generally single males. This gives the host countries a younger population that will eventually result in a higher birth rate. The

country losing population experiences the reverse effect. For instance, the migration from Communist-controlled East Germany to the West after World War II until the Berlin Wall was built gave East Germany a population with a disproportionate number of older people.

The multicultural populations of Canada and the United States are the result of migrations. During the last decades of the twentieth century, “visible minorities” in Canada increased dramatically with immigration from Asia and the Caribbean. Canada and the United States have also become home to many Spanish-speaking migrants from Latin America.

ACTIVITIES

1. Define demography; emigration; immigration; migration.
2. a) What are the main components of population change?
b) What is meant by an exponential rate of growth? The rule of seventy?
3. Imagine you want to open a sports store. What demographic information would you want to know about your target market? Describe how you would use the information to choose the type of sports products that you would hope to sell.
4. Statistics Canada has refused to transfer any data collected since the 1901 census to the National Archives in Ottawa, claiming it would be an invasion of privacy. As a group, do a PMI chart on this issue. Summarize your findings.

The Demographic Revolution

For most of human history, birth rates have been high. Yet, the population grew slowly before the 1700s because death rates were also very high, particularly among infants and young children. Except for a small elite life was, as Thomas Hobbes described it in 1651, “poor, nasty, brutish, and short.”

People had a **life expectancy**—the average number of years that an individual is expected to live—of little more than thirty years. (Today in Canada life expectancy is over seventy-five years.) Disease, poor medical care, poor nutrition, and unsanitary living conditions contributed to the high death rate. Families needed to have many children to ensure a few survived. Larger families were needed also to help farm the land, from which most people made a living, and to provide security for parents in old age. This situation is still common today in many developing countries.

The rapid increases in population growth after 1750 were mainly due to falling death rates. Beginning in Europe, then spreading to North America, and then to developing countries, death rates fell much more rapidly than birth rates. The agricultural revolution increased food production, so that people had better diets. Hygiene and medical knowledge improved. For example, clean drinking water, a more varied and nutritious diet, and vaccination against infectious diseases meant that far more children survived to become parents themselves. Birth rates remained high for a number of years, producing a wide gap between birth and death rates and a rapid growth in population.

The falling death rate was finally matched by a decline in the birth rate. Not all demographers agree on the reasons for this decline. Three likely reasons are economic development, the move to cities, and rising standards of living. The fact that the world’s most economically developed nations now have the lowest population growth rates would seem to support this conclusion.

After World War II, the World Health Organization (WHO) and aid programs made improved health measures available to all countries. Death rates fell, but birth rates are still high in many developing countries. This explains the rapid population growth in areas of the world, such as Africa, that do not have significant economic development. These countries are not equipped to deal with the huge growth in their populations, particularly in the number of young dependents and youths ready for the labour force (see Chapter 14).

Life Expectancy in Years

Country	1900		1950		2000	
	Males	Females	Males	Females	Males	Females
India	22.6	23.3	39.4	38.0	62.5	64.3
Japan	42.4	43.7	62.1	69.5	77.0	83.4
Uganda	n/a	n/a	n/a	n/a	42.2	43.9
Canada	43.2	45.3	63.2	68.7	76.1	82.8
Argentina	n/a	n/a	n/a	n/a	71.1	78.6

Source: Adapted from Statistics Canada, Population Reference Bureau, *World Population Beyond Six Billion*, 1999.
n/a = not available

Figure 13-6 Life expectancy at birth in selected countries for 1900, 1950, and 2000.

Interpreting statistics Why has there been a dramatic increase in life expectancy in all these countries? Suggest why there are differences in life expectancy. How could a demographer use the statistics for Japan and Canada in 1900 to argue that these were developing countries at that time?

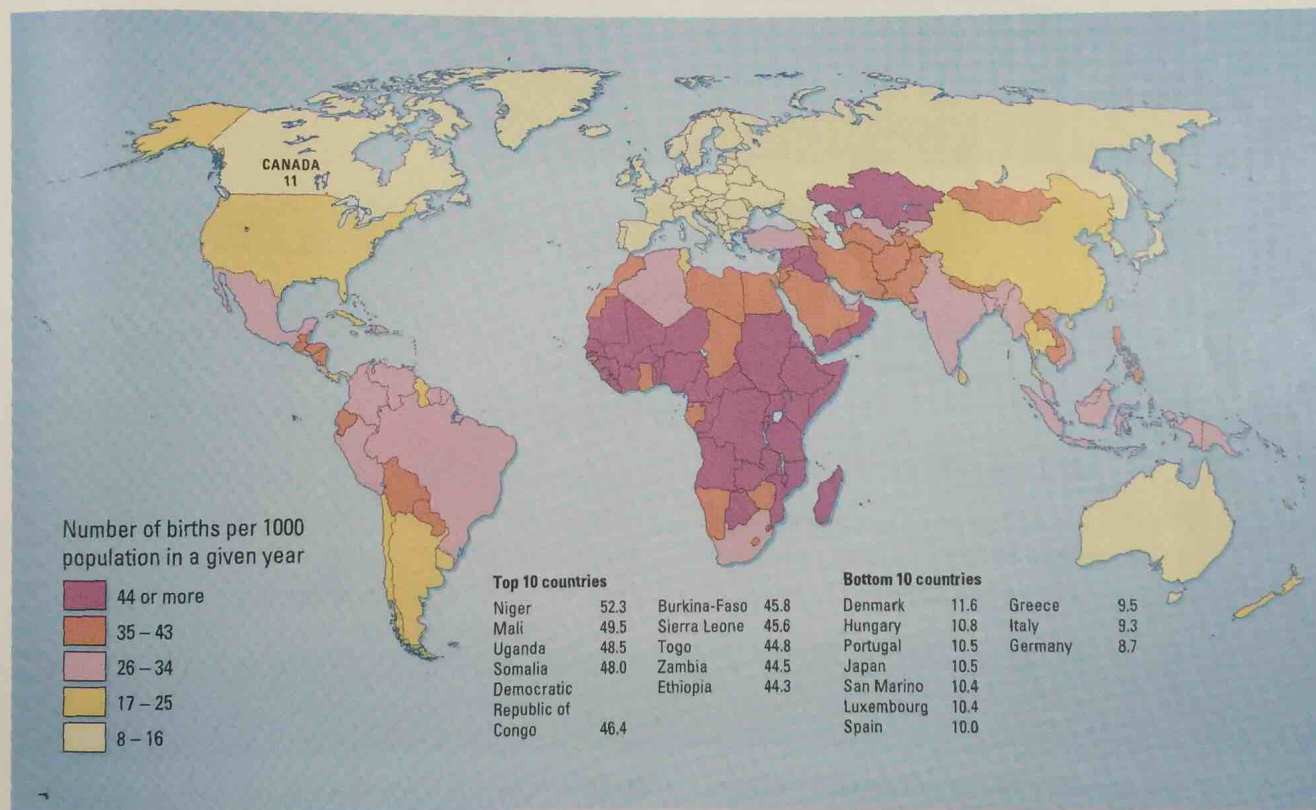


Figure 13-7 World map of birth rates, 1997.

Reading a map

1. Which continents of the world have the highest birth rates? Suggest three reasons that might account for these high rates. Review your reasons as you read further in this and the next chapter.
2. Which continents have the lowest birth rates? Suggest three reasons that might account for these low rates. Review your reasons as you read further in this and the next chapter.
3. With a partner, brainstorm a list of problems that might result for countries experiencing (a) very high birth rates; (b) very low birth rates.

The Demographic Transition Model

Geographers sometimes use *models* to represent reality or a theory. A model simplifies information so as to make it understandable. Models must strike a balance between detail and useful generalization.

One useful way of explaining population change is the **demographic transition** model. It shows changes over a period of time in three elements: birth rates, death rates, and trends in overall population numbers. The model assumes that in any country high birth rates and high death rates (Stage 1) will gradually fall (Stages 2 and 3). Because the model is based on what has happened in developed countries, it assumes that countries will pass through periods of industrialization and urbanization on the way to reduced

birth and death rates. The model is useful in showing how the population growth rates of countries that are industrializing are in a state of transition. It seems that this transition period is unlikely in some countries, particularly in Africa, and so the model must be used with caution.

ACTIVITIES

- Why was world population growth so slow before the 1800s?
 - What improvements in living conditions led to increasing population growth?
- How did declines in birth rates differ between the developed and the developing world?
- With a partner, design an illustrated flow chart that depicts the general trend in life expectancy in the twentieth century.

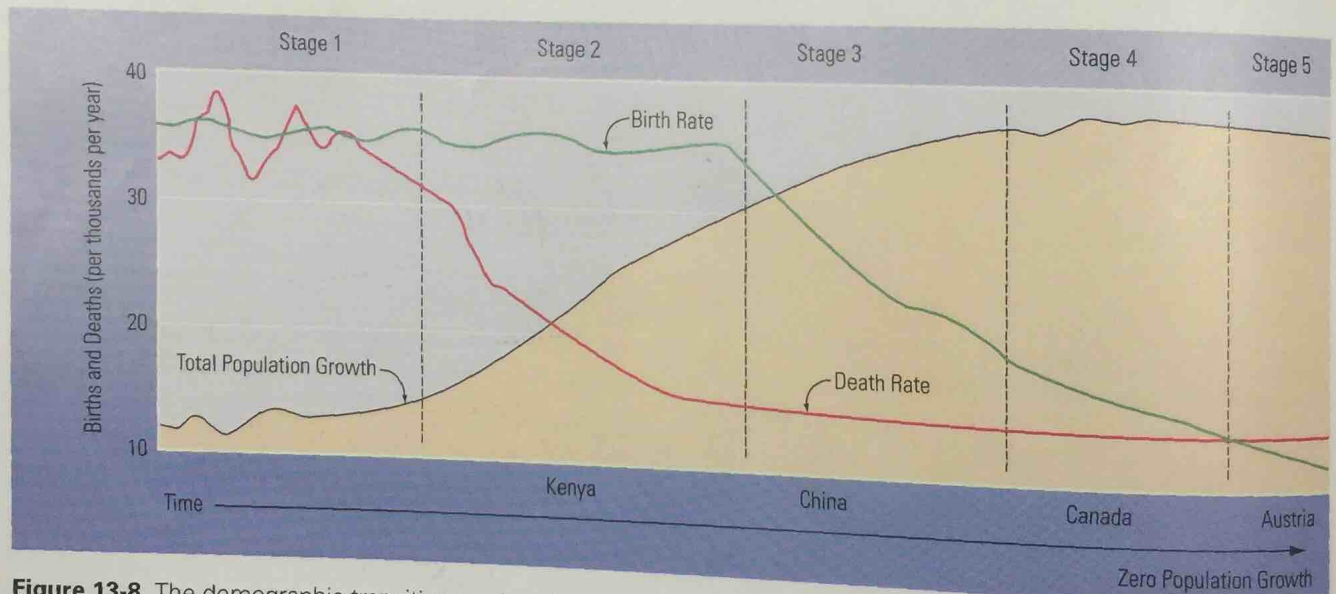


Figure 13-8 The demographic transition model, showing examples of countries in various stages of demographic transition.

Stage 1 High birth rates and high fluctuating death rates result in small population growth. Plagues, diseases, and poor nutrition keep mortality high.

Stage 2 Improved health care, sanitation, and increased food supplies lead to a rapid fall in death rates. Birth rates are still high, so there is a rapid increase in population numbers.

Stage 3 Population growth begins to decline. Birth rates begin to fall. Industrialization, urbanization, and improved living standards lead to less desire for large families.

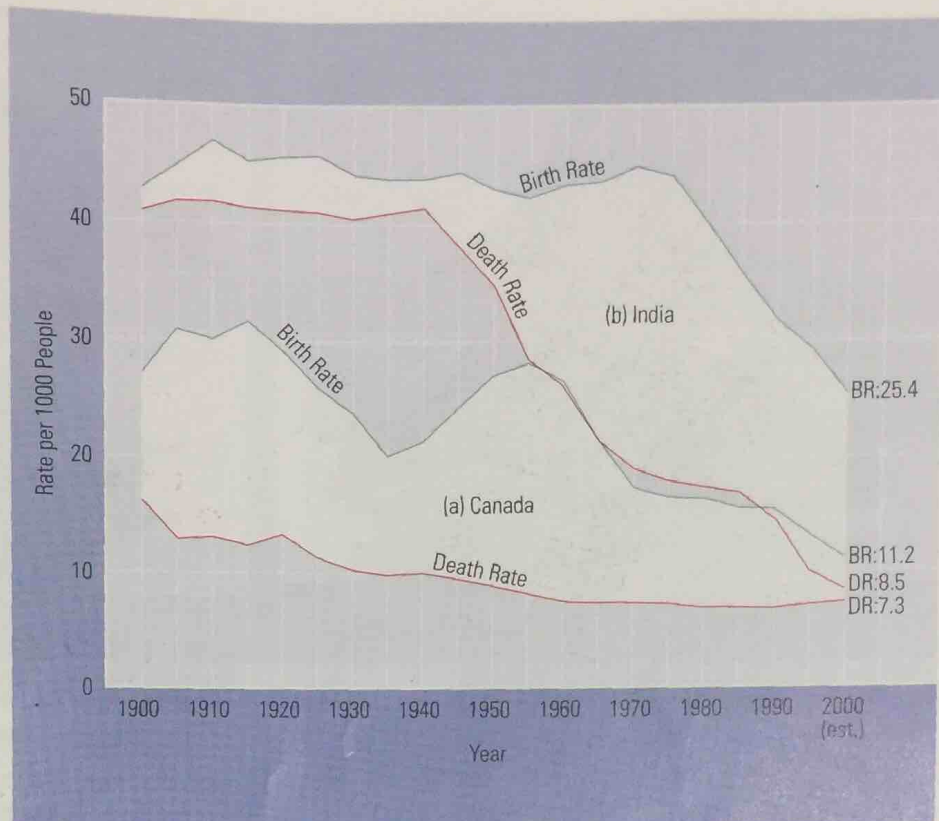
Stage 4 The transition is complete to a low growth rate with low birth rates and death rates. The birth rate may fluctuate in special circumstances, such as in the post-war "baby boom."

Stage 5 Birth rates drop below death rates. This is happening in some European countries and in Japan. It is not known if this trend will extend to other regions.

Figure 13-9 (a) The population of Canada, 1900–2000; (b) The population of India, 1900–2000.

Reading a graph

1. In which years was the natural increase greatest in each country?
2. Based on the demographic transition model, what stages are (a) Canada and (b) India in at present?
3. Predict what will likely happen to India and Canada in the next five decades. Explain your answer.
4. With a partner, write a report to the United Nations making them aware of three problems you have noted as a result of your study of the information on India in the graph.



The Age Structure of Populations

The **age structure** of a population helps us understand the reasons for changes in population. Demographers divide populations into three age groups: children up to the age of fifteen; working adults from ages sixteen to sixty-four; and adults sixty-five years and older. This gives the **dependency ratio**, that is, the proportion of the population that is being supported by the working age group.

Children and older people put pressure on society for medical, education, housing, and other services. In the 1996 census, Canada's population included 21 per cent children and 12 per cent adults sixty-five years and older, giving it a dependency load of 33 per cent. A country like Bangladesh has a dependency load of 53 per cent, made up of 47 per cent children and 6 per cent adults aged sixty-five years and older. The age structure can give us insights into problems that

could arise in the future resulting from a predominantly old or young population.

Population Pyramids

A **population pyramid** is a graph that shows the age and sex structure of a population. A series of horizontal bar graphs for the male and female populations are placed back to back at age intervals of five years, called **cohorts**. Population pyramids make it easier to see the structure of a population. They are also useful in comparing the population structures of different countries. As the examples in Figure 13-10 show, countries with high birth rates have many children and an *expanding population*. A *stable population* will have birth rates and death rates in balance, and a *contracting population* will have a growth rate below replacement level. In general, the expanding pyramids are representative of developing countries, while the stable and contracting pyramids represent developed countries.

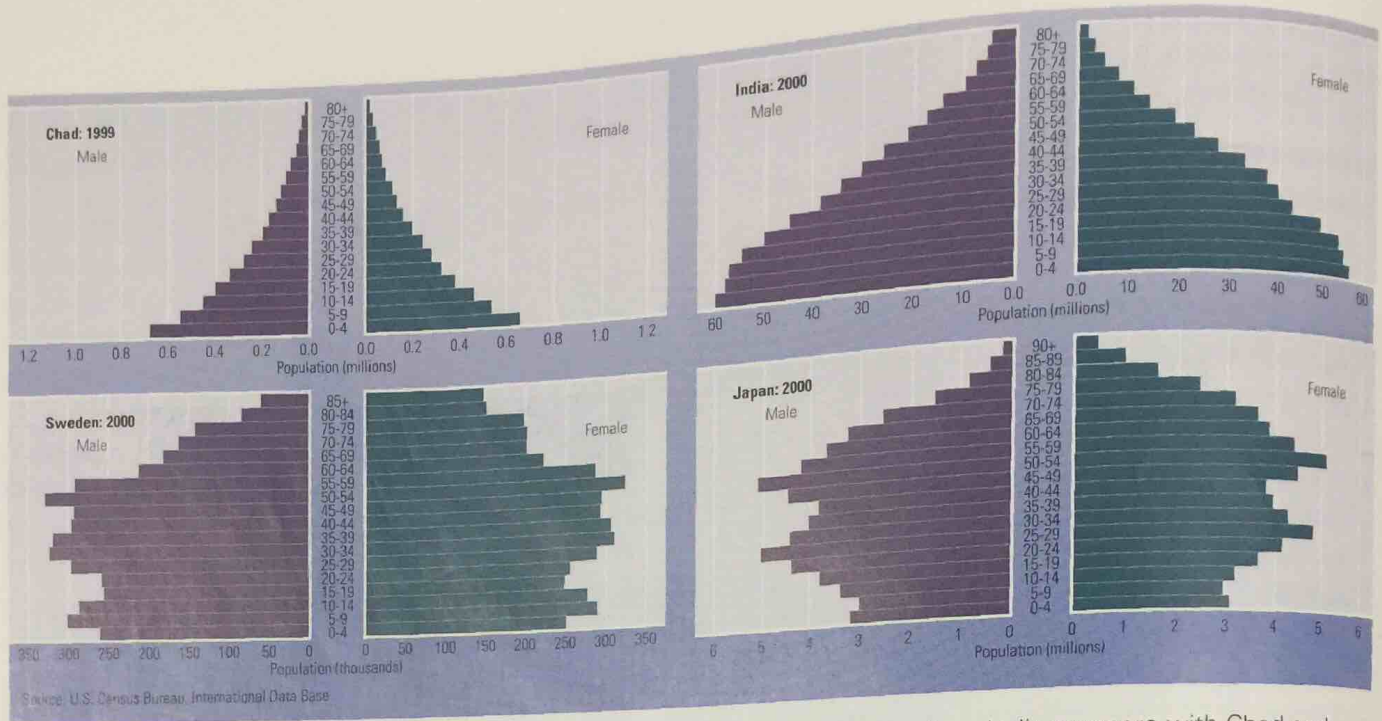


Figure 13-10 Population pyramids for selected countries.

Thinking critically

1. What evidence is there that the pyramid for Chad has a very high birth rate? What per cent of the population would you estimate is under the age of fifteen?
2. What does the shape of the pyramid for India tell you about trends in infant mortality and death rates in the

country? How does India compare with Chad and Sweden in this regard?

3. What does the pyramid for Sweden tell you about the future population numbers in the country?
4. Suggest a number of problems Japan may face as a result of the age structure of its population.
5. In what stage of the demographic transition model is each of the pyramids? Explain each choice.

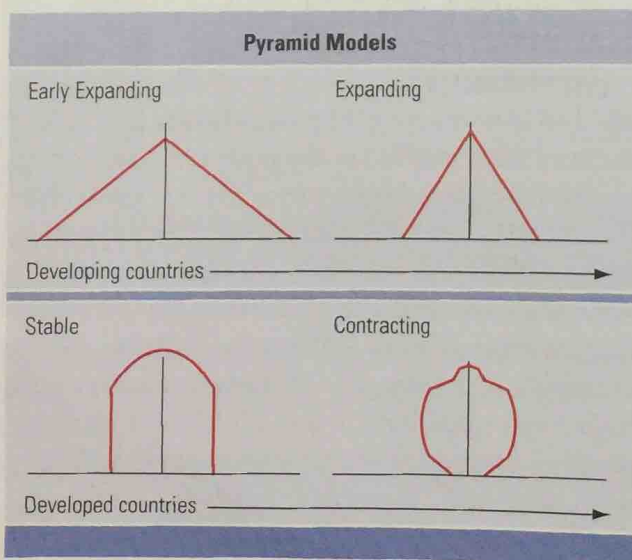


Figure 13-11 Model pyramids of populations at different stages of population development.

Interpreting a diagram Match these models with the population pyramids shown in Figure 13-10.

Canada's Population: The Past and the Future

Canada's birth rate and death rate have been dropping steadily in the past thirty years. This means the population is getting older. In 1951, one in ten Canadians was over sixty-five years of age. In 2020, one in five will be over that age. Life expectancy in Canada increased from an average of forty-five years in 1900 to sixty-five by 1950 and to seventy-nine by the year 2000. This trend is the same for most developed countries.

The increasing numbers of elderly people put immense strains on social and medical services. There are fewer children to look after aging parents. This has put pressure on the health care system to provide more long-term care for the elderly. The cost of health services for the aged continues to rise as medical technology becomes ever more complex.

	Planned No. of Immigrants	Actual No. of Immigrants
1989	150 000–160 000	192 001
1990	165 000–170 000	214 030
1991	220 000	232 760
1992	250 000	254 864
1993	250 000	256 575
1994	250 000	224 372
1995	250 000	212 845
1996	195 000–220 000	226 050
1997	195 000–220 000	216 044
1998	200 000–225 000	174 100
1999	220 000–225 000	180 000
2000	220 000–225 000	n/a

Source: Citizenship and Immigration Canada.

Figure 13-12 Canada's immigration levels, planned and actual, 1989–1999.

Interpreting statistics What patterns can you see in this table? Suggest three factors that could explain differences between planned and actual immigration.

The age structure of Canada's population is one of the main factors the federal government considers when deciding on the number of immigrants Canada should accept each year. Without immigration between 1991 and 1996, our population would have shrunk by almost 750 000 instead of increasing by more than 1 600 000. The average age of the Canadian population would have increased rapidly.

The number of immigrants entering Canada fluctuates above or below the 200 000 level. This is far from the federal government's goal, which is to have annual immigration equal 1 per cent of the population. The difference between planned and actual immigration levels is shown in Figure 13-12. Immigration numbers have never come near the record level of 402 432 immigrants in 1913, which represented 5.5 per cent of a population of 7.3 million. The main difficulty the government faces is in attracting young, skilled workers and entrepreneurs to offset the aging workforce.

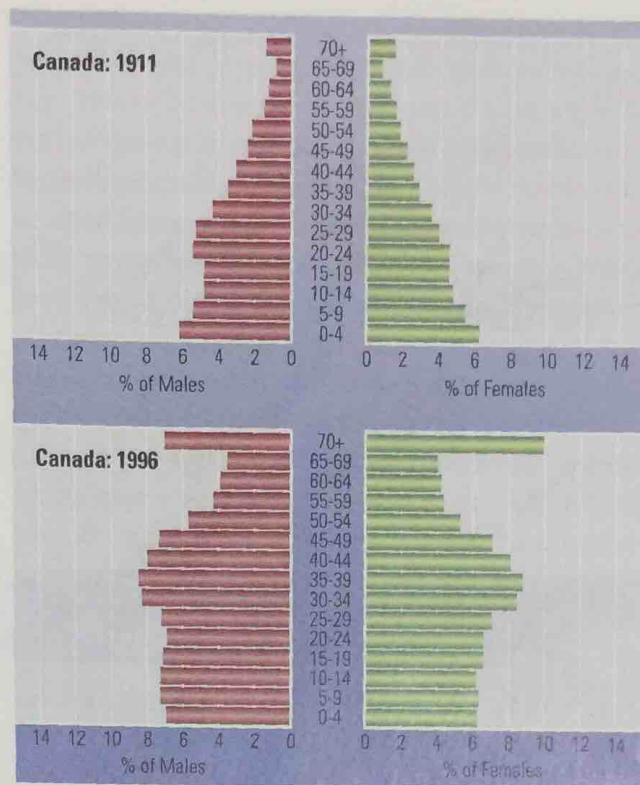


Figure 13-13 Population pyramids for Canada, 1911 and 1996.

Reading a graph

1. Refer to Figure 13-11. At what stage of development—expanding, contracting, or stable—would you place each of the pyramids?
2. What impact will the increasing number of dependents in 1996 have on the dependency load?
3. In the 1996 pyramid, which age group has significantly more females than males? Give possible reasons for this pattern.
4. What other information can be found by analysing these pyramids? Give examples of how government and business might use these pyramids to deal with present and future trends.

The number of refugees accepted into Canada in 1999 was close to the projected number of 22 000. The single largest group of refugees came from China. More money is now spent on handling refugee claims than on processing regular immigration. Critics have pointed to cuts in the 1990s to the budget of the federal immigration department and the greater attention paid to refugees than to regular immigration for the failure to reach immigration targets.

Dependency: Too Young Or Too Old

There has been a major change in the age structure of the world's population as the numbers of people have increased. There have never been so many people in the dependent category. This change will put increasing pressure on the financial resources of countries. In Japan, for example, the life expectancy is eighty-one years for males and eighty-four for females, the highest in the world. The government has declared the aging

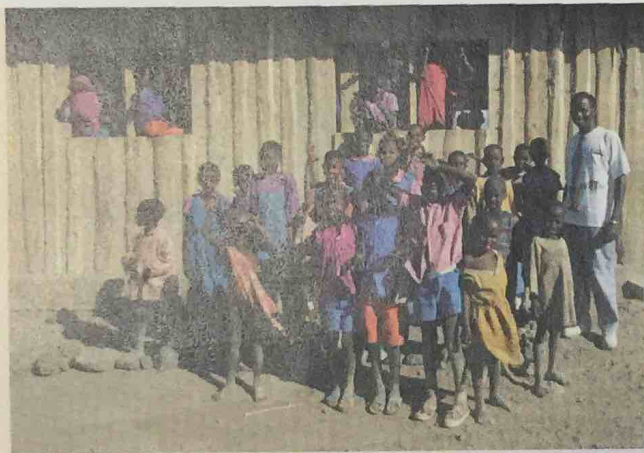


Figure 13-14 Top: Masai children in Kenya stand in front of their village school. Currently, some 44 per cent of Kenyans are under the age of fifteen; only 3 per cent are sixty-five years or older.

Bottom: A group of Japanese seniors pose for a photographer in Yokohama, Japan. Fifteen per cent of Japanese are under the age of fifteen, while 16 per cent are sixty-five or older.

population to be its greatest future challenge. If present trends continue, one-quarter of the Japanese population will be over sixty-five by the year 2025. Years of exceptionally low birth rates mean there are fewer workers to care for them. How and whether Japan can maintain its economic position in the face of these problems remains to be seen.

At the other end of the scale, some developing countries have young dependents under the age of fifteen making up half their population. Any fall in birth rates in these areas has been offset by a greater number of women who can bear children, even if families are smaller. These countries remain in a cycle of poverty, as their limited resources and attempts to improve development are swallowed up by young populations. India and sub-Saharan Africa, with a combined population of over two billion people, face a daunting task of providing employment for the increasing numbers of young people entering the labour market. Young men in particular grow restless as they reach working age and find few opportunities to improve their standard of living. This results in an under-employed generation that could threaten the stability of entire regions.

ACTIVITIES

1. Describe the connection between the age structure of a population and its rate of population growth.
2. **a)** What is the dependency ratio? Why is it important for a country to know this figure for future planning?
b) Why does an aging population present a serious problem in the developed world?
3. **a)** What information does a population pyramid show about a population?
b) What information can you discover about a country's past and future by analysing a population pyramid?
4. **a)** What effects do migrations have on the structure of the receiving country's population?
b) How would the age structure of the population in Canada be different if there had been no immigration?

CASE STUDY

The One-Child Policy: China's Solution

Nearly one-fifth of the world's population lives in China. Even with growth rates below the world average, China adds twenty million children to its population each year. These are twenty million more mouths to feed in a country that depends on agriculture, yet where less than 15 per cent of the land is suitable for cultivation. Although it is one of the largest countries in the world, half of China's area is composed of mountains, hills, and deserts.

China's present population problem goes back to the policies adopted by the newly established Communist government in 1949. The leader, Mao Zedong, encouraged increases in the population of 540 million. He saw this as a way to make China into a great power. When challenged to explain how China would feed the growing population, Mao pointed out that "every stomach comes with two hands attached." By 1972, the population had swelled to 852 million. Dealing with growth rates reaching 2.85 per cent was using up over half the output of China's economy. The govern-

ment reacted with a publicity campaign in the 1970s that encouraged people to limit their family to two children. This had the effect of reducing the growth rate to 1.57 per cent, still too high for a population approaching 900 million.

The death of Mao Zedong in 1976 opened the way for a major effort to control population growth. In 1980, the Chinese government launched a policy of one child per family, a challenge for a culture that valued large families. Cash rewards, free medical care, and improved educational and housing opportunities were offered as incentives for those who had one child. People who did not cooperate with the policy were fined for each child after the first-born, and lost many medical and educational privileges. Pressure to be sterilized and have abortions was common at the height of the program in the mid-1980s.

By 1980, China's birth rate had been halved. The success of the one-child policy was greater in urban than in rural areas, which could not be as tightly controlled. Sons were valued as labourers on the farms, and they were expected to look after their parents in their old age. This, and reports of forced abortions and infanticide if the first-born was a girl, led the government to relax the policy in the late 1980s. A second child was allowed in rural areas if the first-born was a girl or was born with a disability.

Figure 13-15 A crowded Sunday market in Menghun, Yunnan Province, China.

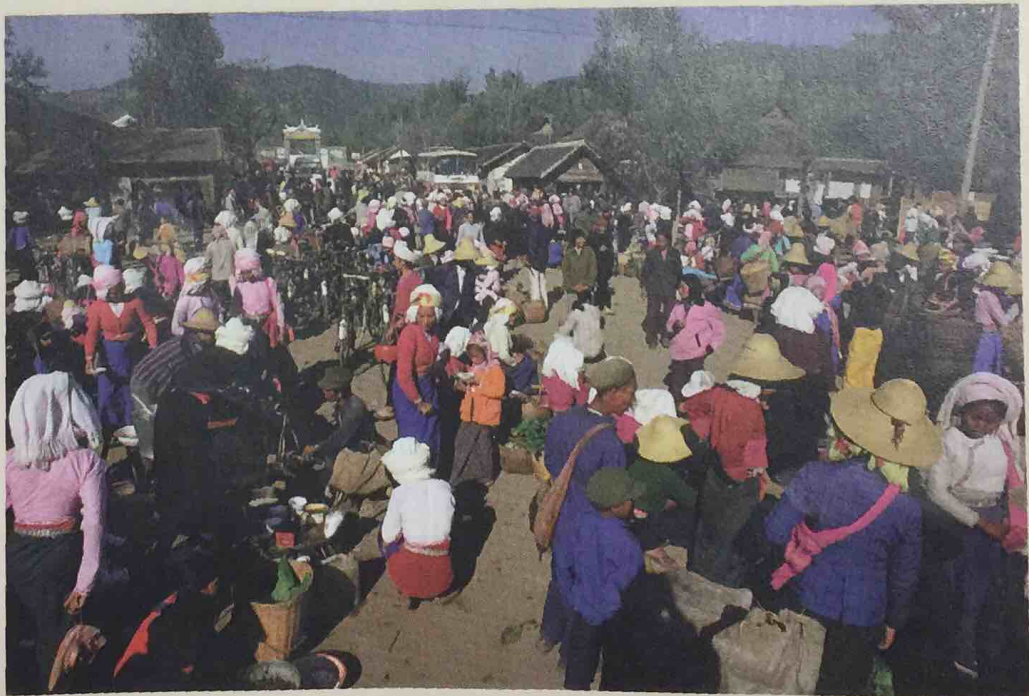




Figure 13-16 A poster advertising the one-child policy in China.

Thinking critically Chinese culture traditionally favours male babies over females. Use information from this case study to suggest why this poster shows a little girl.

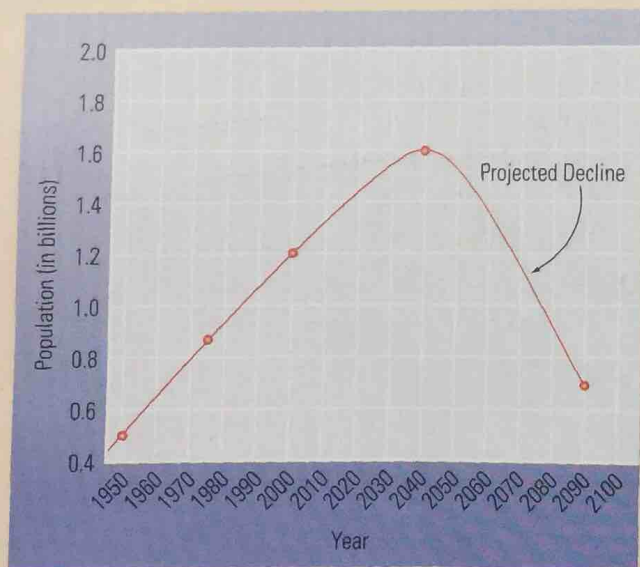


Figure 13-17 China's projected population in the twenty-first century.

Reading a graph

1. In what year is China's population expected to peak? What will be the total population at that point?
2. What is China's population estimated to be by 2090?

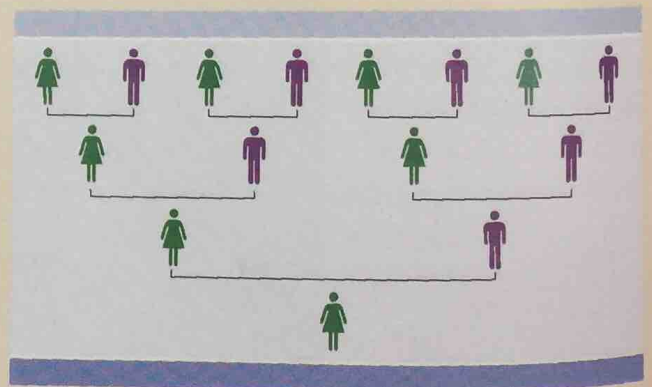


Figure 13-18 The effect of China's one-child policy on the extended family.

Thinking critically Traditionally, Chinese society was structured around the extended family, with each child having many brothers and sisters, aunts, uncles, nieces, nephews, and cousins. How might the one-child policy affect family values in China?



Figure 13-19 These Chinese children will grow up in a country with an aging population. Identify the social costs these children will have to carry when they become working adults.

Today, China's one-child policy is firmly established in the cities. City dwellers realize that one child gives them the financial means to take advantage of the luxuries available in most cities. Still, China began to face a baby boom in the 1990s, with hundreds of millions of rural peasants apparently ignoring the policy. A visit in 1999 to central China by a Canadian reporter found people who wanted to have as many children as possible. He quoted a Chinese demographer, who said, "The one-child policy has long been more slogan than reality."

The results of the one-child policy on Chinese society are now beginning to be felt. The growth in the rural population is putting more pressure on farmland. This may lead to a migration of massive proportions by the younger rural population to cities. Another problem is the aging of the people who were born after the 1949

revolution. Increased life expectancy means that the 400 million Chinese born before introduction of the one-child policy will have fewer young people working to support them. Will these young people want to help their aging fellow citizens? What has been called the "Little Emperor Syndrome" has been reported widely. These are the children who have been raised in single-child families and feel no sense of obligation to their families or society at large.

Present estimates indicate that the program has been successful in reducing the rate of growth of the population. The number of the Chinese population will only be known when the results of the 2000 census are announced, although the figures may be in doubt because of the huge task of counting that many people, many in remote areas.

The effects of population growth in China are important for the world. Growth rates in a population comprising over a sixth of humankind are a concern to all people. Canadians particularly have felt the immediate effects of population pressure in southern China with the arrival of smuggled Chinese migrants on Canada's West Coast. And if a controlled society like China has such difficulty in limiting population increase, what hope is there for India, which will eventually outstrip China to have the world's largest population?

Questions

1. Examine maps of the physical geography (landforms, climate, natural vegetation, and soils) of China in your atlas and other resources. Describe the geographical limitations that exist in China for the support of an expanding population.
2. Describe the situation in 1980 that led the government to impose a one-child policy.
3. Do a PMI analysis on outcomes of China's one-child policy. Summarize your results as a justification or a condemnation of the policy.
4. With a partner, write a series of short letters between a young Chinese couple and their parents who are pressuring them to have more than one child.
5. Organize a debate on the topic of a government's right to control people's right to have children. Is such a policy ever justified? Explain.

Where Do Six Billion People Live?

Population distribution refers to the way people are spaced over the Earth's surface. The Greek fathers of geography studied population distribution. They called their part of the world **ecumene**,

and we now use this word to describe permanently inhabited places.

Approximately 35 per cent of the world's land area is not good for settlement. Over half the population lives on only 5 per cent of the land, and 90 per cent of people live on 20 per cent of the land. Two-thirds of people live within 500 km of the ocean.



Figure 13-20 World population distribution. Why do you think the dot method is used in preference to methods such as shading for distribution maps?

Reading a map

1. Are the most densely populated areas north or south of the equator?
2. Which two continents are most densely populated?
3. Compare this map with a map showing world landforms or relief. What relationship do you see between:
 - a) densely populated areas and lowlands?
 - b) sparsely populated areas and highlands? Identify two highland areas that are densely populated.
4. Compare this map with a map showing climate. What is the relationship between population distribution and areas that are:
 - a) very cold throughout the year?
 - b) very dry?
5. Identify two very dry areas that are densely populated. Refer again to the relief map, and give an explanation for this population density.

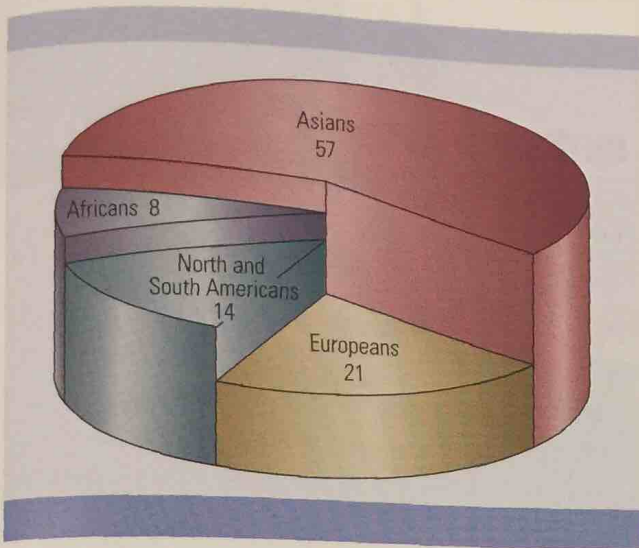


Figure 13-21 If we could shrink the Earth's population to a village of precisely 100 people, it would look something like this.

Population density describes the number of people in a given area. Population densities for the countries of the world are shown in Figure 13-22. These are **crude densities**. They are calculated by dividing the population of a country by its area. These figures are useful for general comparisons, but do not take into account the wide variations that exist within larger countries. For example, most Canadians and Chinese live at far higher densities than those indicated for Canada and China on the map. Rural and urban densities also differ dramatically in most countries. There are many explanations for the different population densities found in countries. The web in Figure 13-23 shows some of the major physical and human factors affecting population density.

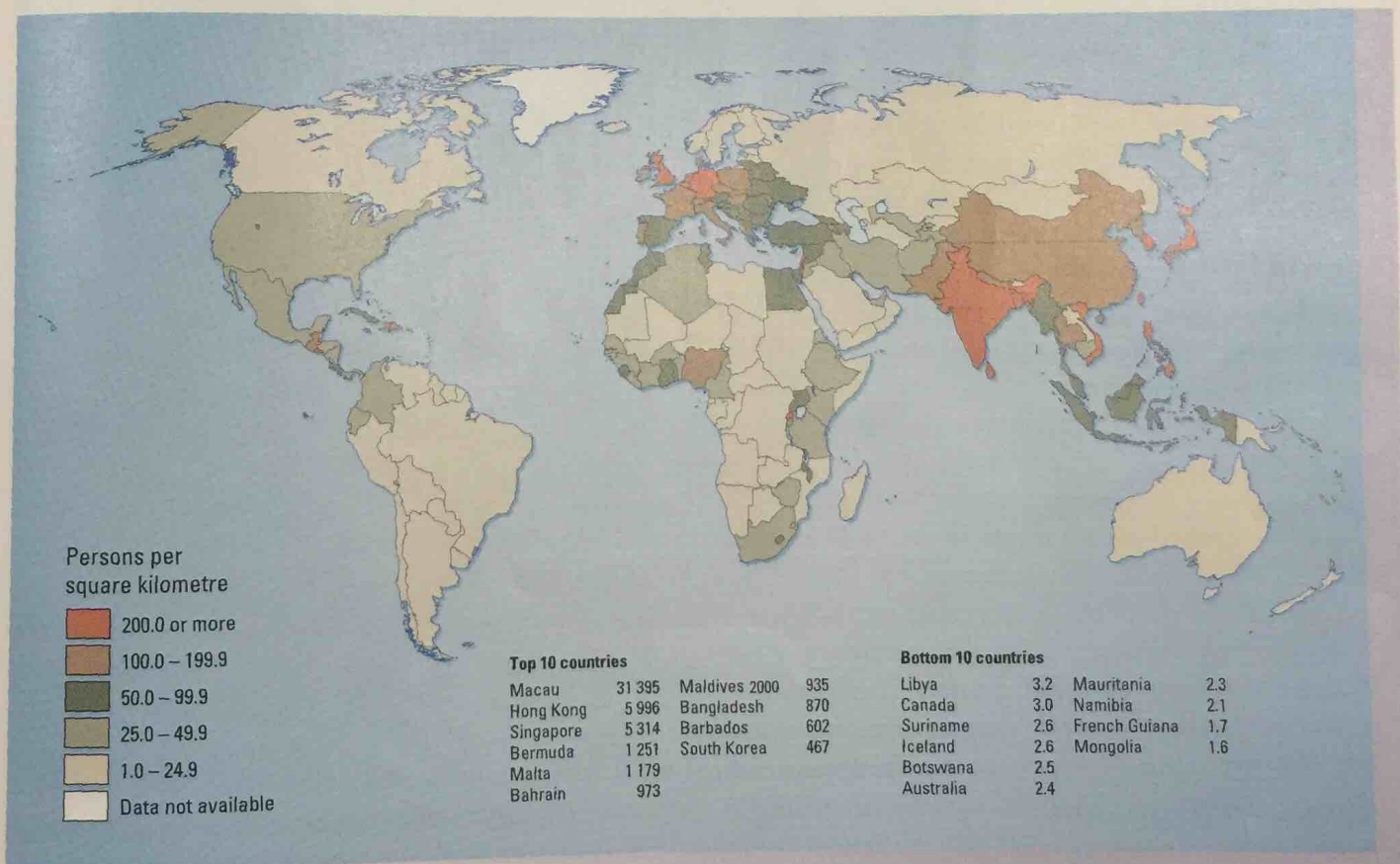


Figure 13-22 Population density of the countries of the world, 1997.

Reading a map

1. Which two areas of the world have the highest population densities?
2. List a number of uses for a map like this.
3. How does the map reinforce the information in Figure 13-21?

Physical Factors

Climate — Areas that are very dry or very cold generally have lower densities.

Landscape — Lowlands near the rims of continents have the highest densities.

Resources — Areas rich in a variety of resources will attract higher densities.

Soils — Rich river valley and lowland soils result in higher densities.

Vegetation — Areas of very dense vegetation, such as rainforests, have low densities. In temperate zones, former forested areas and grasslands have high densities.

Water — A reliable water supply from rainfall or rivers is necessary for higher densities.

Accessibility — Areas that are easier to reach by land or sea will increase in population.

Human Factors

Communications — Areas that are easier to reach by land or sea will increase in population.

Culture — Nomadic or agricultural cultures may determine the level of density.

Development — Areas with a highly developed economy will have higher densities.

Disease — Areas of high incidence of disease will have low densities.

Government policies — May encourage settlement in remote areas, as in the case of Brazil and the Amazon basin or in Communist USSR, where settlement was forced.

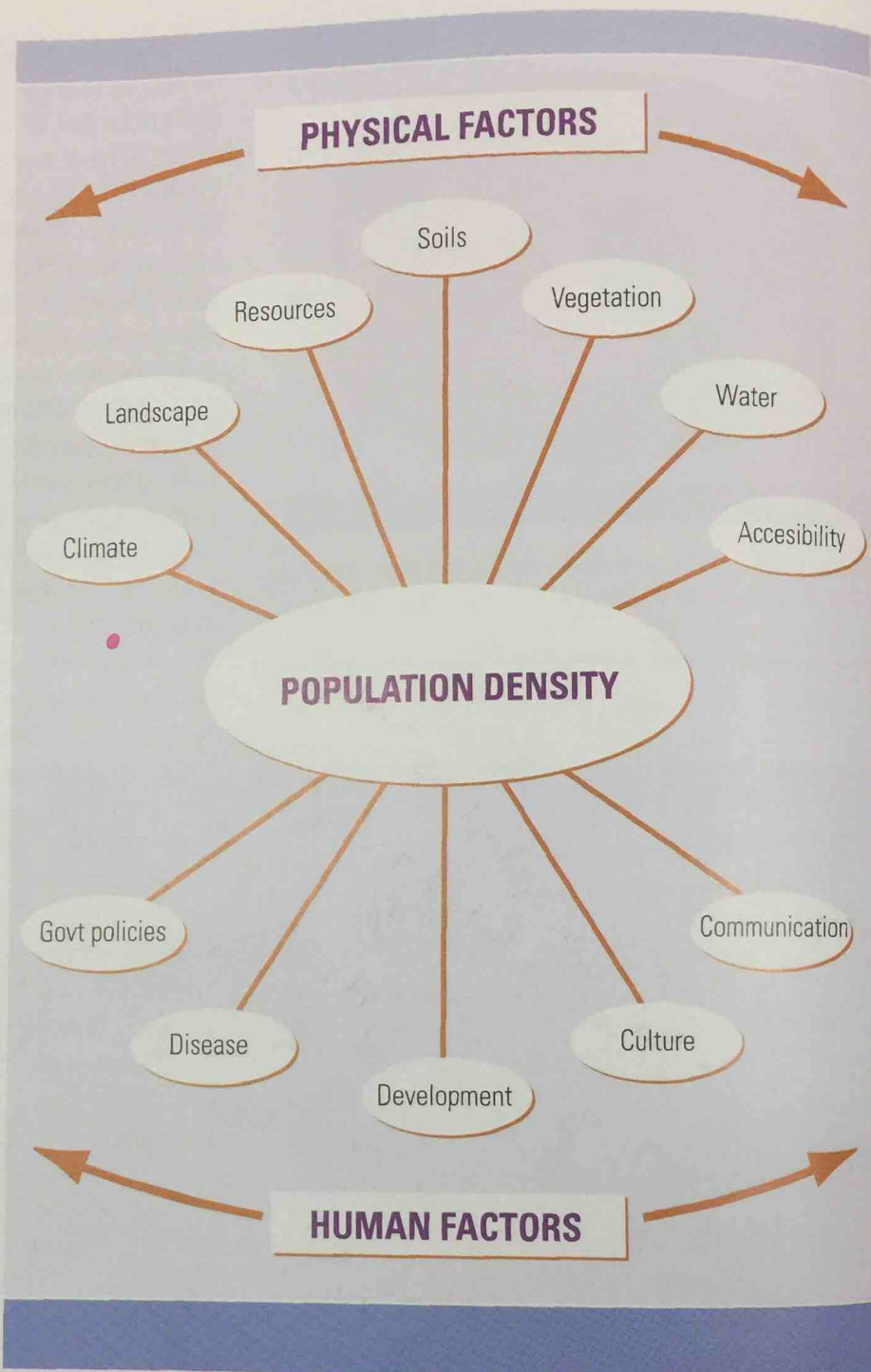


Figure 13-23 Major factors affecting population density.

Interpreting a diagram

1. The density of most countries is determined by a combination of some of the factors shown in the ideas web. Which factors apply best to Canada? Which to British Columbia? For each area, rank the factors in order, starting with those having the greatest effect.
2. Working with a partner or in small groups, choose a country from each of the categories in the legend of Figure 13-22. Use the ideas web to give reasons for each country's being in the category.

What Are the Limits of Population Growth?

"A finite world can support only a finite population; therefore population growth must eventually equal zero."

—Garrett Hardin, ecologist, author, *The Tragedy of the Commons*



Figure 13-24 Albrecht Dürer, the German Renaissance artist, depicted the Four Horsemen of Apocalypse—Conquest, War, Famine, and Death.

Thinking critically Describe, or draw, an illustration on the same theme that would be appropriate for the twenty-first century.

The idea that there are limits to the number of people that the Earth's resources can support is not a new one. In 1798, at the beginning of the Industrial Revolution in Britain, a British economist, Thomas Malthus, published *Essay on the Principles of Population*. At the time the population of Britain was seven million. The country was in Stage 2 of the demographic transition, so the population was growing very quickly. Malthus predicted that the numbers of people would be checked by diseases and famine at under fourteen million as the population outstripped the food supply. He pointed out that population increases exponentially (2, 4, 8, 16...) while food supplies increase arithmetically (1, 2, 3, 4...) Eventually, the growth in population would be checked.

By 1999, Britain's population of about fifty-seven million and a world population of over six billion had made a mockery of this prediction. Malthus was not able to foresee the improvements in agriculture, transportation, hygiene, and medicine that would make larger populations possible. Also, in the nineteenth century, migrations of millions opened up new farmlands in North and South America, Asiatic Russia, and Australia. These eased population pressure.

Some thinkers, called neo-Malthusians, predict that in the long term, Malthus was right. Disaster will overtake populations in the world's poorest developing countries in the next fifty years. They predict increasing shortages of arable land to grow enough food, conflicts over fresh water, declining fish stocks, and the spread of AIDS or other diseases. Africa will be most vulnerable to these threats.

Neo-Malthusians claim that migrations, technology, and new farming lands cannot solve the problems in the poorest developing countries. A leading neo-Malthusian, Lester Brown of the Worldwatch Institute, says that millions of people will die while the population in the developing world tries to return to a balance with the environment's ability to provide food. He points to shortages of water in India and cropland in China, countries with more than a third of the world's population, as indicators of impending disaster. By 2050 the population of countries like Nigeria and Pakistan are projected to triple in size; Ethiopia, with sixty-five million people, will reach a population of over 210 million, and the Congo will rise to 165 million. Only Nigeria has significant resources that may allow it to deal with this challenge. The others, unless there are profound changes, will see their population increases checked

by famine, disease, and war. The latest ammunition for neo-Malthusians comes from studies by William Rees and Mathias Wackernagel of the University of British Columbia. They point out that if everyone were to live at the North American standard of living, the resources of three Earths would be required.

Central to these ideas that there are limits to growth is the concept of the **carrying capacity** of the land. This is the idea that land can produce only so much in the way of food or goods given the technology of the time. As population increases, it reaches a point beyond which the land cannot support that number of people. This is when the carrying capacity of the land is exceeded. As population outstrips food supplies, it is reduced by checks such as famine and disease until it stabilizes close to the land's carrying capacity (Figure 13-25).

Not everyone agrees with the neo-Malthusians. Organizations such as the United Nations, the World Bank, and most international aid agencies are more positive in their outlook. They claim technological developments, increased trade, and more efficient ways of

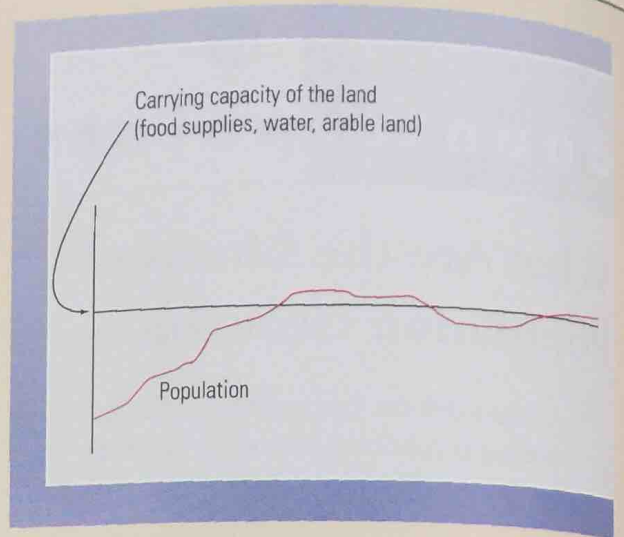


Figure 13-25 Carrying capacity of land and population. Unless new ways of increasing the carrying capacity of the land are found, population, after reaching a certain level, fluctuates above and below carrying capacity.

Thinking critically What technological changes in the twentieth century increased the carrying capacity of farmland in Canada? What other changes might increase or decrease carrying capacity in the future?

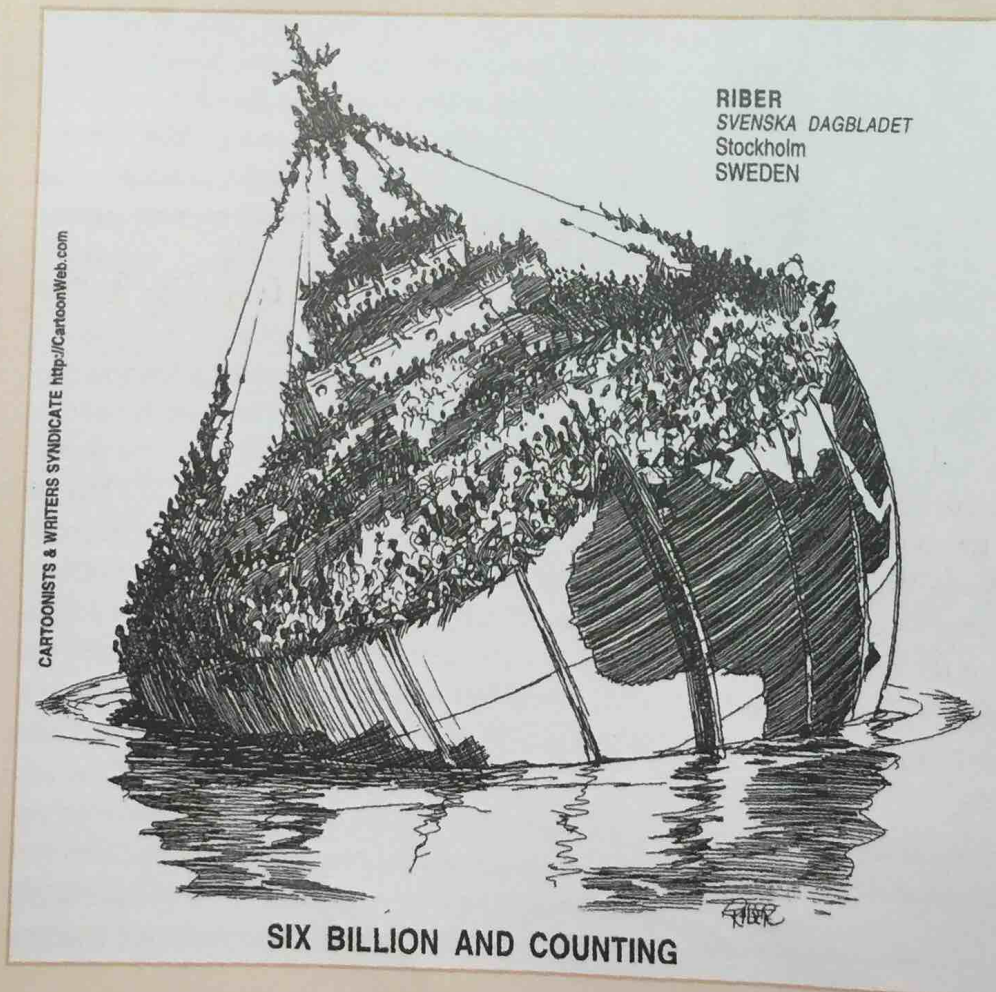


Figure 13-26

Interpreting a cartoon

What is the point of view of the cartoonist regarding present world population figures? Is the cartoonist a neo-Malthusian or not? Explain

sharing the Earth's resources will ease the problems of developing nations. They point to the rapid increases in population in the twentieth century that were always matched by increased food production. Food production has increased by 25 per cent since the 1960s. New developments in genetic engineering of crops and animals could repeat this success. The optimists point to the best-seller by noted ecologist Paul Ehrlich, *The Population Bomb*, published in the 1960s. It argued that an exploding population would plunge large parts of the world into famine as early as the 1970s. None of its dire predictions happened.

Those with a positive outlook claim that educational programs will increase awareness of the benefits of population control. They point out that enough food is produced to feed everyone adequately, and it is the distribution system that causes malnutrition in some countries. Increased globalization, they believe, will help to create a more equal distribution of food and resources. Raising the standard of living of people around the world, they say, will cause population growth to level off. Alexander Cockburn, a critic of neo-Malthusians,

accuses them of holding out no hope and believing "that the Third World [developing countries] is incapable of reform and improvement, and efforts to assist it are useless."

Analysing the Issue

1. Explain the concept of carrying capacity.
2. Briefly summarize the viewpoint of each of the following on trends of world population: Malthus, Brown, Rees and Wackernagel, Ehrlich, and Cockburn. Which do you find most credible? Why?
3. With a partner, use a three-column organizer to compare and contrast the views of neo-Malthusians and the optimists on the effects of future population growth. Then use the information to script and perform a dialogue between supporters of the two viewpoints.
4. With a partner, design a visually appealing poster that effectively illustrates the problem of carrying capacity and population in an area of the developing world where people live at subsistence levels.

Nutritional Density

There are great differences in the productivity of farmlands in different parts of the world. For example, the Fraser Valley in southern British Columbia has exceptionally rich agricultural soils, but its output is restricted by a short growing season. Canadian farms cannot match the output of areas like southern China, where rich soils and ideal climate produce three crops a year. This means that a square kilometre of farmland in southern China can produce far more food for people than a similar area in the Fraser Valley. **Nutritional density** of land is a measure of how much nutrition in calories can be produced from the land. The nutritional density column in Figure 13-27 shows the average nutritional densities for the countries listed.

Country	Densities in km ²	
	Crude	Nutritional
Australia	2	37
Canada	3	60
China	122	1192
Egypt	6	2203
Japan	334	2629

Figure 13-27 Crude population densities and nutritional densities for selected countries, 1997.

Interpreting statistics Why are the differences between crude and nutritional densities for Canada and Australia lower than for the other three countries? Use a climate map in an atlas to help explain why the nutritional density in China, Egypt, and Japan is so much higher than the crude density.

ACTIVITIES

1. Define population distribution; population density; ecumene.
2. How useful are crude densities in giving a picture of how many people could live in Canada?
3. Why is nutritional density a more accurate measure of density in the developing world?

Earth's Crowded Future

The world's population will continue to grow in the twenty-first century. What is not certain is how fast it will grow. Given their large populations, China and India's success in bringing their population growth under control are important considerations in the size of the overall world population.

Age structure is an important factor in determining how fast a population will increase. Developing countries with high numbers of young dependents will likely experience greater population growth than developed countries. The number of developing countries that will improve their standards of living to a point where birth rates begin to fall cannot be predicted.

Changes in birth rates in the developed world also cannot be foretold. For example, it's possible that a major cultural change in Canada and the United States could change fertility rates and bring about another baby boom.

Birth rates will continue to decline worldwide, but the large base in countries like India means increases will continue to be too high for the population to be sustained without environmental damage. The future will be determined by the youth of developing nations. The age at which they choose to marry, and the number of children they have, may be the most important decisions of the twenty-first century.

LOOKING BACK

Develop an Understanding

1. Compare the typical shapes of population pyramids for developing nations and developed nations. Describe the differing dependency problems for these nations.
2. Using countries from different regions of the world as examples, explain how population density figures for countries can often be deceiving.
3. Construct imaginary population pyramids for populations that are:
 - a. expanding rapidly following a lengthy war
 - b. expanding after experiencing a devastating famine
 - c. stable with an aging population
 - d. experiencing a negative growth rate.Match your pyramids with the population pyramids of actual countries today.
4. Do a PMI analysis on the results of an influx of young migrants into British Columbia. Summarize and compare your findings with others.

Explore the Issues

5. Define the term *overpopulation*. Use your definition to suggest the optimum level of population the world can sustain today. Support your choice, and compare it with others in the class.
6. Debate the motion: *The ideas of Malthus are more relevant today than ever before.*
7. As a group, write a policy statement for the minister of immigration. Suggest amendments to the Immigration Act that would make it more responsive to the changing demographics of the Canadian labour force.
8. With a partner, create a map of the Canadian or British Columbian ecumene. Around the map, explain significant patterns that are evident and the impact these have on Canadians.
9. Imagine it is twenty-five years in the future. Write the population entry for your region or community for the *Encyclopedia of British Columbia* to be printed that year.

Research and Communicate

10. With a partner, write and deliver a “news fact” broadcast on the topic of population growth over the past two thousand years. Focus on the rate of change, absolute numbers, and the situation today.
11. With a partner, make a collage of images that depict the impact of the changing demographic structure of the Canadian population.
12. Write and record a number of thirty-second radio commercials informing people of the importance of Canada’s five-year census counts.
13. As a group, make a poster showing world, or Canadian, population growth in the twentieth century. Illustrate the poster with images depicting the impact of this growth on people in various parts of the world at different times.
14. With two other students, research a complete demographic profile of a country from each of the developed, developing, and least developed worlds. Use a poster format to compare and contrast the countries.
15. Imagine it is 2025. Describe the changes you will experience as a result of changes in the Canadian population.
16. With a partner, do some research on the effects the aging population will have on the workforce in British Columbia, and any measures being taken to deal with shortages. Make a presentation to your classmates on career choices that they might consider as a result of your findings.
17. Use the Internet to investigate and classify the population pyramids of four different countries.
18. Conduct a poll in your community to determine the level of understanding of issues surrounding world population growth. Take care in framing the questions so that they are clear and cover the main themes of this chapter.
19. With a partner, write and perform a question-and-answer dialogue between a radio interviewer and a demographer. Focus the interview on the numbers of elderly people in the world and the problems facing society because of the increasing number of older dependents.
20. Imagine you are a staff member with the Canadian embassy in a developing African country. Write a memorandum to the Canadian Secretary of State for External Affairs on the problems that country might face as a result of the increase in young dependents. Suggest some steps Canada might take to help.
21. Use Figure 13-26 as a model to draw a cartoon that might appear in a future year, as shown in the U.N. estimates of future growth given in Figure 13-1.