CHAPTER
2 Population

Learning Outcomes

Where is the world's population distributed?

2.1.1: Identify the four regions where most of the world's human inhabitants are clustered.
2.1.2: List the main reasons for the uneven distribution of the world's human population.
2.2.1: Compare and contrast the three types of population density.

Why does population growth vary among countries?

2.3.1: Explain the three types of indicators used by geographers to measure population change.
2.4.1: Explain how changes in total fertility rates, infant mortality rates, and life expectancy affect population structure.
2.4.2: Define dependency ratio and describe how a population pyramid can be used to study population structures.
2.5.1: Explain the stages of demographic transition.

How might population change in the future?

2.6.1: Give examples of how some developing countries have lowered birth rates.
2.7.1: Explain the components of future population growth and the elderly support ratio.
2.7.2: Describe the possible stage 5 of demographic transition.
2.8.1: Summarize Malthus's population theory.
2.8.2: Describe how modern supporters of Malthus have used his theory to interpret recent population-related changes.
2.8.3: Evaluate Malthus's population theory and list the main criticisms of the theory.
2.9.1: Describe the stages of the epidemiologic transition, including the leading cause of death in each stage.
2.10.1: Describe a possible stage 5 of the epidemiologic transition and state reasons why such a stage might emerge.

Chapter Overview

 The world population today is approximately 7 million people, concentrated in a few regions of the world. More people are alive and living longer than any other time in the history of humankind. Chapter 2 of the textbook examines population, an important part of human geography. According to the chapter, population is concentrated in several places across the globe and several factors such as climate and elevation influence density and distribution of population. The chapter also discusses the growth and decline of population, emphasizing that most of the growth in world population occurs in the poorest

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regions of Africa, Asia, and Latin America. The chapter introduces students to the structure of population, the processes involved in population growth and decline, the reasons for the change and the measurements geographers use to describe and represent these changes. The chapter ends with a critical look at future population growth trends. It introduces students to the concepts of the demographic transition and the epidemiological transition models as indicators of and characteristics of those changes. In addition, the chapter also is a critical discussion of Malthus's theory of population growth and the dichotomy its application presents to current and future world population change.

Section 2.1 Population Concentrations

Section 2.1 introduces students to the distribution of humans across the globe. It points out that people are unevenly distributed because of several factors including elevation and climate. According to the chapter, people do not inhabit places that are too cold, too hot, too dry, too wet, or too high. However, it points out the exceptions in most cases. The chapter also identifies the four regions of the world with large clusters of population regions, which includes East Asia, South Asia, Southeast Asia, and Western Europe. Most students are aware that China has the world's largest population (approximately 1.4 billion in 2011). Begin with a discussion of this fact and segue into another about population and its role in human geography. Emphasize that geographers begin any discussion of population with its distribution. Point students to the map in Figure 2.1.1, which shows population concentrations around the world. Engage students in a discussion of the possible reasons for this concentration. It is also important that students can distinguish what is merely populous versus a densely populated region. Introduce students to the cartogram, another tool that geographers can use to show clustering. A cartogram shows the size of countries according to population rather than land area, as is the case with most maps.

Countries with populations over 100 million are labeled.

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Figure 2.1.3. Population Cartogram

As a follow-up activity, students can complete the assignment in the workbook, *Encounter Human Geography*, Exploration 3.1. As an alternative or additional exercise, your students can go to MasteringGeography and explore the MapMaster Interactive Maps for sections 2.1 and 2.2. Here you will find both short answer and multiple choice questions related to both sections. You may use this as a form of evaluation or reinforcement of students learning. Discuss with students other densely populated areas like northeastern United States, Brazil, and Western Africa.

Section 2.2 Population Density

Section 2.2 continues with the question of where population is distributed and focuses on population density. It distinguishes between the three measurements of density: arithmetic, physiological, and agricultural density. Also called population density, the text defines **arithmetic density** as the total number of people divided by the amount of land. **Physiological density**, a more meaningful measurement, is defined as the number of people divided by the amount of arable land. The chapter also defines another measurement, **agricultural density**, as the ratio of farmers to the amount of arable land. Students should understand that a comparison of arithmetic and physiological density could give geographers a clear conception of the capacity of the land to provide sustenance for humankind. Conversely, the use and comparison of agriculture and physiological density may be utilized to understand the relationship between resources and population. At this point, students should be introduced to Figures 2.2.1–2.2.3. As mentioned above, MapMaster Interactive Maps in MasteringGeography could be used to reinforce students' understanding of the concept of Carrying Capacity—the ability of the land to feed its people. Have students use the world map in MapMaster Interactive Maps to compare and contrast the various densities for different world regions to complete their understanding of the role and importance of each type of density in geography.

Section 2.3 Components of Change

The third section of the chapter introduces the students to a discussion of the factors that influence population growth in different countries. Demographic measures of population, which helps students in their research and understanding that places have differences. Specifically, it examines the three main measures of population growth: **natural increase rate (NIR), and crude birth and crude death rate**. The chapter simply defines NIR as the percentage rate of increase in population in a given year not inclusive of migration. Students should understand that geographers compute NIR by subtracting crude death rate from crude birth rate. The text defines **crude birth rate** as the total number of live births in a year for every 1,000 people alive in the society and crude death rate as the total number of deaths in a year for every 1,000 people alive in the society. Highlight the rate of growth of population from the 1800s to the present. It might be a good idea to discuss with your students the relationship with population growth over time and improvements in agriculture and technology. Point students to figure 2.3.1. Students should be aware that the areas with the fastest growing population are also among the poorest countries in the world. Use the maps in Figure 2.3.2 -2.3.5 to engage students in a discussion of population growth. It is also important to comment on the prospect of **doubling time**, which is the number of years it takes a population to double. The importance of this as an indicator of rapid population growth cannot be underscored. You may also segue into a discussion with your students of some problems and issues rapidly growing populations can cause. To reinforce this concept, you can assign students work from *Encounter Human Geography*, Exploration 3.2.

Section 2.4 Population Structure

In continuing the discussion on spatial variations of population growth, section 2.4 highlights other measurement or indicators of growth. These measurements include total fertility rates, infant mortality rates and life expectancy. According to the text, a combination of these factors produces a distinctive

demographic pattern of age—young and old. Total fertility rate is defined as the average number of children born to women at all levels of society. Infant mortality rate is the number of infant deaths per 1,000 live births per year. Life expectancy at birth on the other hand, measures the amount of years an infant is expected to live. At this point, you draw students in a discussion about the measurements. Focus their attention on the maps, Figures 2.4.1–2.4.3. Have them interpret the map and identify areas with the highest and lowest indicators. Help them to make the correlation between these measurements and levels of economic development. From this point, you can discuss further why these spatial differences exist. It is important to emphasize that those regions with the lowest life exp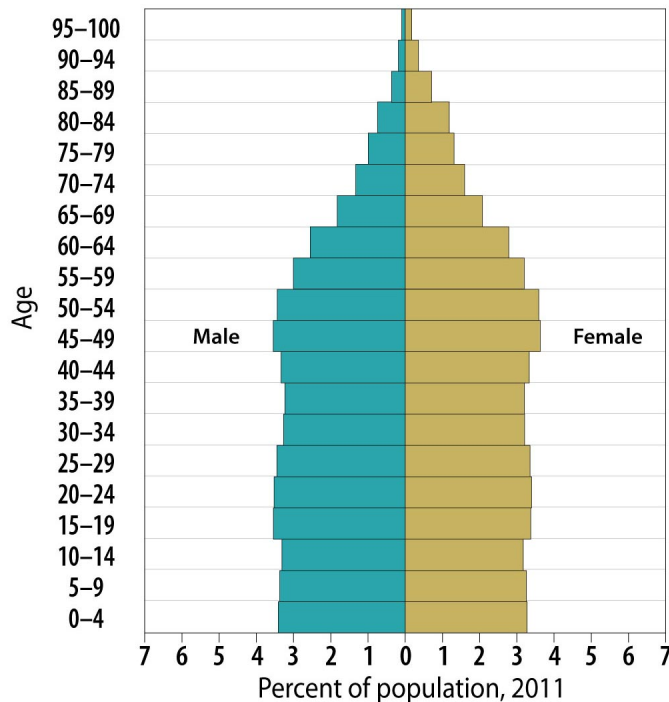ectancy, highest total fertility rate, and highest infant mortality rates are often the poorest countries in Africa, Asia, and Latin America. To evaluate students' learning and to reinforce these concepts, you can have students use MapMaster, which will allow students to play around with two layers—total fertility rate and the other that shows population under 15 years old. Students can answer the questions in MapMaster. Very important for this section, students should understand the role and importance of the population pyramid. Population pyramids are bar graphs that display a country's population by age and gender.

Students should understand that the shape the pyramid has is determined by crude birth rate and that the shape, particularly that of the base, is an indicator of development, like other measurements. See exercise below in Discussion Topics and Classroom Activities.

**Figure 2.4.5 Population Pyramid of the United States**

Section 2.5 The Demographic Transition

Section 2.5 deals with the processes of change in the structure of a population. This is called the demographic transition according to the text. Geographers used the demographic transition model to represent this change in population structure over time. According to the text, the model comprises of four stages, and each country falls in one stage or another. The book points out that no country is presently at stage 1 of the cycle, though throughout human history, most countries fell into this stage. This was because there was no actual growth in human population. Stage 2 and 3 of the model are comprised of rapidly growing population, though there is some tapering off in the latter. The text further describes the fourth stage of the model where a decline in birth rate and much larger decline in death rates occur. To introduce your students to the concept of demographic transition model, review the population pyramid with them. Let them describe the demographic characteristics of the pyramids, then lead them into a discussion of the demographic transition model and its purpose in human geography. Introduce Figure 2.5.2. Discuss the characteristics of each stage with your student; if possible let them create their own chart with examples as a class assignment. Ask students where the United States would fit. Provide your students with examples of population pyramids of countries across all spectrums of economic development. You could also discuss with students the possibility of a stage 5 and what countries might fit this category. (This also appears in section 2.7.) The images in Figure 2.5.3 are excellent examples of

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pyramids to use in your discussion. You could follow up your discussion with Exploration 3.3 in *Encounter Human Geography.* Students could complete the multiple choice and short response questions after they worked in Google Earth[TM]. See also the exercise below in Discussion Topics and Classroom Activities.

Section 2.6 Declining Birth Rates

Section 2.6 examines declining growth rates and the efforts some countries have made to slow their rates of growth. According to the text, population growth has been increasing at a much slower rate worldwide. This is despite regions with overwhelmingly large birth rates. The text enumerates a number of possible explanations for the slowing growth and these include lowering through education and health care and through contraception. To introduce students to this section, show them Figure 2.6.1 shown below.
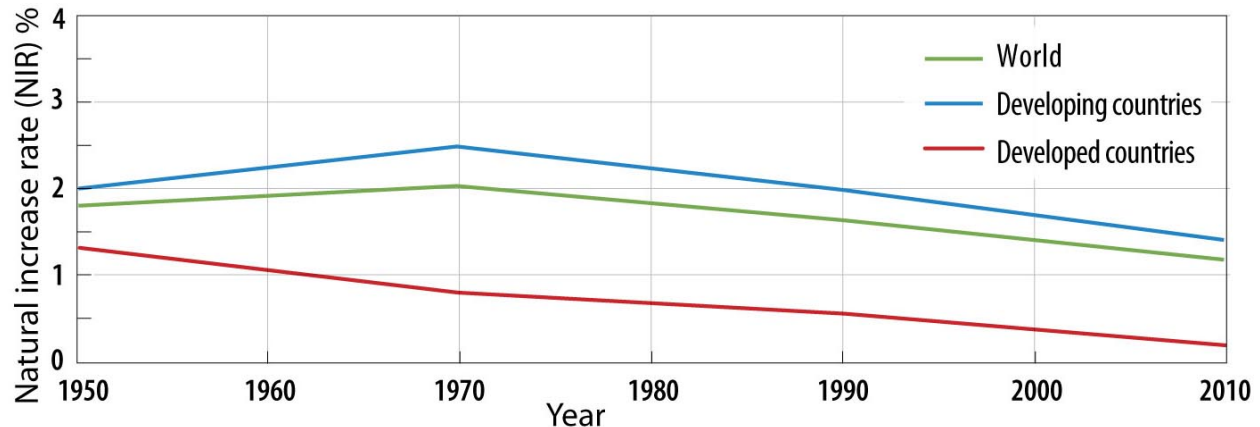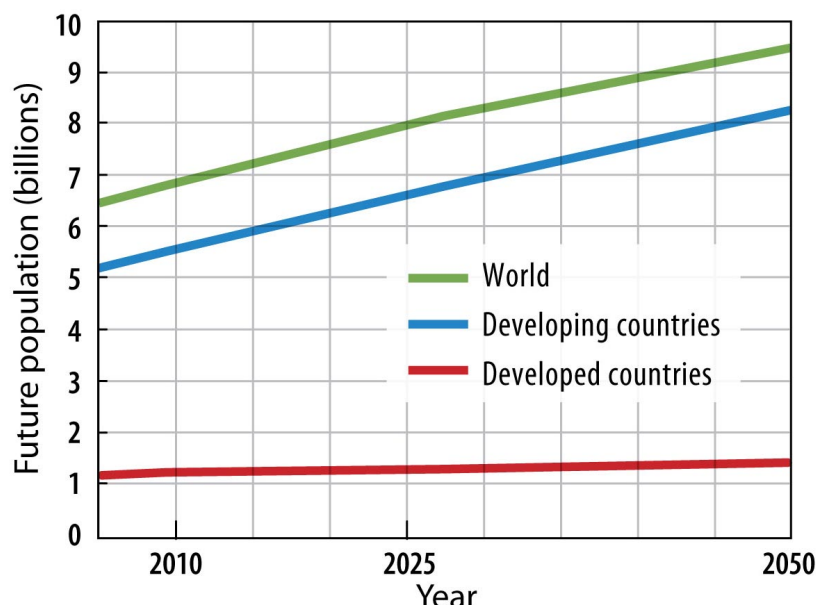

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Figure 2.6.1 NIR 1950–2010

Have them interpret the graph. Engage your class in a discussion about the slowing growth of the world population. Focus their attention on the map showing decreases in birth rate in Figure 2.6.2. Let students attempt to identify countries with the lowest birth rates. You can place the map side by side with the map showing distribution of women using family planning. It is important to emphasize that declining birth rates mostly occur in MDC but there are a few exceptions like Bangladesh. You can discuss with your students the negatives and positives of a declining growth rate. Students should understand that a declining population is just as problematic as a burgeoning one.

Section 2.7 Population Futures

This section discusses the future world population projections and the possibility of a large number of older adults exceeding other age groups in some countries. The text calls this the **elderly support ratio** and this is defined as **"**the number of working-age people (ages 15–64) divided by the number of persons 65 or older." This is shown in Figure 2.7.2. It also compares family planning methods in both India and China in light of the fact that these two nations are the most populous in the world and will drive population policy decision making in the future. The text notes the diverging population policy methods employed in both India and China. Particularly significant, discussed here, is the case of Japan, whose working population is dwindling as people are aging. Faced with a diminished workforce, older people are working longer. Discussed here also is the probable addition of a 5th stage to the demographic transition model with Japan and western European countries as first members. Display the following statement taken from the textbook on page 46. *"The United Nations forecasts that if the current TFR of 2.5 remains unchanged, world population would be even higher in 2050, approximately 12 billion."* Engage students in a discussion of this statistic.

Draw students' attention to figure 2.7.1 and let them determine which world region's population is likely to grow more in the future. Emphasize that LDC will grow faster while MDC population growth would decline. From there, discuss with students how various countries could deal with the issues of rapidly increasing population or declining growth. You could use the examples given in the text and have students give other instances**.** See Chart below in Classroom activities.

Figure 2.7.1. Future Population Growth

### Section 2.8 Malthus's Grim Forecast

Section 2.8 discusses Robert Malthus's theory that population growth would one day outstrip the food supply. It provides arguments in support of and against Malthus's theory. The main argument in support of Malthus's theory is that there is a much wider gap between population growth and food production than anyone projected and that other resources of food are also dwindling. According to the text, the main opposing article is that uneven social and economic development is responsible for world hunger instead of population growth. To teach this concept, you can place your students in groups with the instruction to find arguments to support or oppose Malthus's theory. You can provide your students with additional resources to bolster their arguments. They can present this in class or write a critical response to the additional resource.

Section 2.9 The Epidemiologic Transition

Population may also vary because of sudden spikes and decline in population caused by death in each stage of the demographic transition. Section 2.8 calls this the epidemiological transition model. The model, based roughly on the demographic transition, is divided into four stages: The stage of pestilence and famine, the stage of receding pandemics, the stage of degenerative diseases, and the stage of delayed degenerative diseases. Like the demographic transition model, each stage consist of declining death rates but they are explained by changes in types of diseases ranging from epidemics to slow-acting degenerative diseases. You can teach the epidemiological transition by reviewing the demographic transition, then comparing what happens in each stage. Students should understand that there is some correlation between improvement in economic development and the epidemiological transition. You may also have students complete an exercise in *Encounter Human Geography* Chapter 4, Human Health**.** Additional Google Earth activities can be assigned to your students on MasteringGeography.

Section 2.10 Global Reemergence of Infectious Diseases

Section 2.10 examines a possible emergence of a stage 5 to the epidemiological transition model. According to the text, the cause is rooted in three possible explanations that include poverty, evolution, and increased travel. The text charges that infectious diseases are more prevalent in poor areas because of unsanitary conditions. In addition, disease resistance to antibiotics continues to evolve while people are more mobile than a century ago. The text discusses the effect that mobility has had on diseases such as HIV/AIDS. The text recognizes AIDS as the most deadly infectious disease in recent times with most effect in sub-Saharan Africa. Remind students about the possible addition of the 5th stage of the demographic transition model and discuss if you could do the same for the epidemiological transition. Segue into discussion about these, stressing the reasons for a possible stage 5. Introduce students to Figure 2.10.1, a map showing the distribution of tuberculosis in 2009.
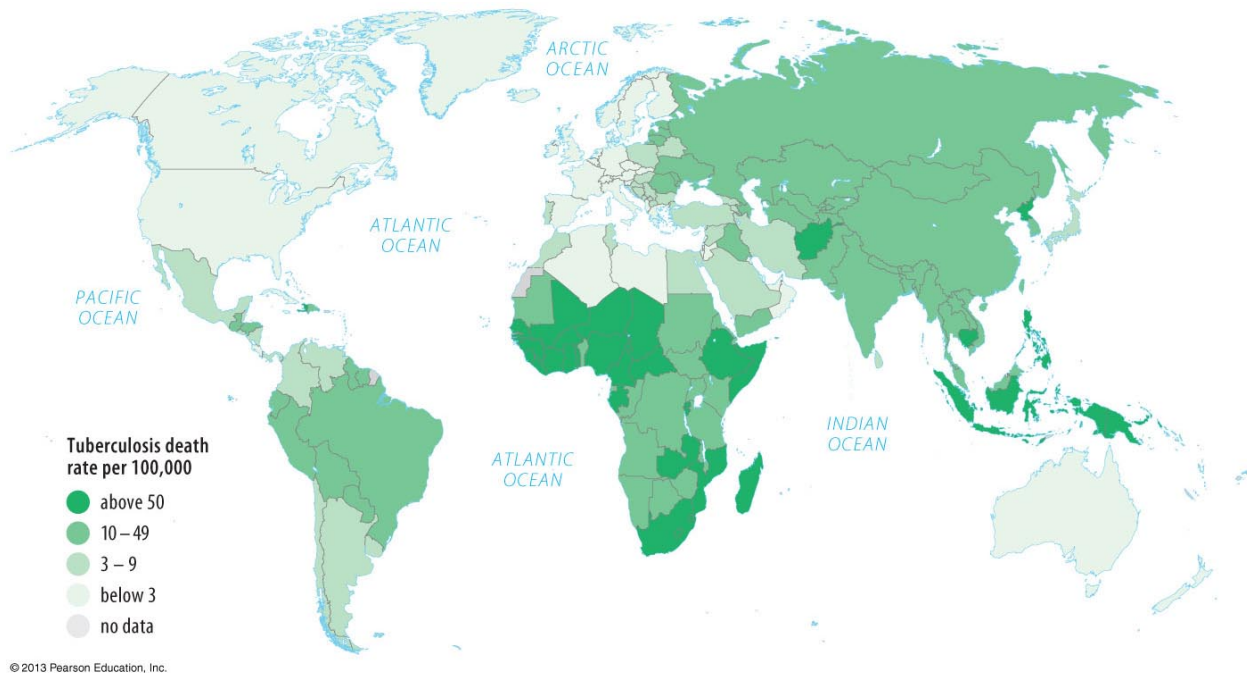
Figure 2.10.1 Tubercolosis (TB) Deaths

Discuss with the students the reasons for such a distribution. Students also should know the factors that influence the spread of HIV/AIDS. Show how it spread throughout the United States by showing the maps in Figure 2.10.3. Emphasize the role of rapid transportation in its spread. Extend students' learning by having your students complete an exercise in *Encounter Human* Geography Chapter 4, Human Health. You may also have your students look at MapMaster interactive maps, Layered Thematic Analysis Activities.

Answers to Thinking Geographically Questions

1. *The U.S. Census Bureau is allowed to utilize statistical sampling to determine much of the information about the people of the United States, such as age and gender. However, for determining the total population of each state and Congressional District, the Census Bureau is required to count only the people for whom a census form was completed. What are the advantages of using each of the two approaches to counting the population?*

ANSWERS WILL VARY: The census department counts population in two ways. They use statistical sampling and they count census forms of people to whom they send them. In other words, they attempt to count each head in the United States. Doing a head count or a physical enumeration does not guarantee that everyone will be counted. In the 1990 census, more than 8 million people remained undercounted. The census is supposed to count people of every race, creed, and ethnicity, yet some, including aliens or people who just refuse to acknowledge the surveys, are never counted in the census. While this is advantageous for use in determining congressional seats, it does not help in adequately allocating federal resources. The physical enumeration is advantageous for use in small cities and towns where it is easier to count and recount the population. The sampling method, on the other hand, is useful for identifying and counting undercounted population. With statistical sampling, only a fifth of the total population is actually counted. For one, the cost of counting this way is significantly reduced. One advantage of using statistical sampling is that it might count people who are traditionally undercounted including blacks, Hispanics, and children. It generally gives data that can be extrapolated to calculate with some accuracy the total numbers in the population. Additionally, the data is easier to check for errors than a physical enumeration, not to mention cheaper. The Census Bureau believes the ideal situation is to employ both methods and as in geography, the decision is a matter of scale. Small areas benefit more from physical enumeration while in larger areas with larger populations sampling would be more appropriate.

2. *Some humans live at very high density (Figure 2.CR.1). Scientists disagree about the effects of high density on human behavior. Some laboratory tests have shown that rats display evidence of increased aggressiveness, competition, and violence when very large numbers of them are placed in a box. Is there any evidence that high density might cause humans to behave especially violently or less aggressively?*

ANSWERS WILL VARY. Although scientific evidence suggests that animals at very high densities become aggressive, the same for humans is inconclusive. Without engaging in any empirical research, we only have to do a cursory study of areas of high densities in the world. The textbook enumerates four regions with extremely high population densities. These include East Asia, South East Asia, South Asia, and Western Europe. East Asia consists of Japan and China. Both have high densities but in different areas. In Japan, most of its population lives in urban centers while in China dense population lives around river valleys in rural china where they engage in agriculture. There is no evidence here that suggest their behavior aggressive or otherwise. Instead everyone coexists, albeit with political flare-ups in china. Flare-ups are attributable to other causes as are less aggressive behavior. Western Europe is also another example. Their less aggressive behavior is a result of economic development rather than high density. Aggressiveness is as much a response to political and economic behavior than overcrowding.

3. *Members of the baby-boom generation—people born between 1946 and 1964—constitute nearly one-third of the U.S. population. As they grow older, what impact will baby boomers have on the entire American population in the years ahead?*

The baby boomers, as they are called, comprise approximately a third of the U.S. population and they fall between the ages of 47 and 65. Between 1947 and 1965, the population of the United States grew, doubling the population growth rate of the previous twenty years. All across the United States, baby boomers account for most of the populations in most towns across the United States. The implication of this is that these people will become older soon; some are already at or nearing retirement age. As

in countries like Japan, the United States will end up with an aging population sooner rather than later. This means that there will be a shortage of workers, especially since birth rates have declined to the lowest in history in 2011. Health-care cost will likely increase, especially in the final stages of the epidemiological transition model. The dependency ratio of the baby boomers will increase as the group ages, creating a burden on the economic system and on the younger workforce of the country.

Discussion Topics and Classroom Activities

Population pyramid exercise.

1. Discuss the distribution of world population. Emphasize that the densest populations are found mostly in Asia and in Europe. Other population clusters include the northeastern region of the United States.
2. Select two contrasting countries from the following website. http://www.census.gov/ipc/www/idb/country.php. You can use Benin and Denmark, and use the data for 2009 or 2010. Have the students plot a population pyramid using graph paper, then answer the following questions:
a. Compare and contrast the demographic characteristics of Benin and Denmark using the population pyramids you created.
b. Explain the relationship between the structure of the population and economic development for both nations. How can this structure be both negative and positive for both nations?
c. At what stage of the demographic transition model would you place each nation? Explain.
3. Discuss population policies and issues in the world today. You may assign the following chart as class work.

Country	*Problem*	*Population Policy*	*Problems/Solution/Degree of Success*
Japan			
India			
China			

Additional Resources

Population Pyramids and Demographic Data by Country
http://www.census.gov/ipc/www/idb/country.php

Developing Sampling Techniques
http://www.census.gov/history/www/innovations/data_collection/developing_sampling_techniques.html

Boom or Bust? The Economic Effects of the Baby Boom
http://research.stlouisfed.org/publications/review/94/09/Boom_Sep_Oct1994.pdf

Census Bureau: http://www.census.gov/