

Modeling Population Changes

Population projections are important to leaders and scientists, in order to plan for the future needs of the population. Consider the following scenarios:

Schools: The local Department of Education must determine the need for a new school in the next five to 10 years. What type of information will they need to make this decision?

Infrastructure: City planners are responsible for making sure the city has enough roadways, water, sewers, and utilities. How will they know whether too many people will strain these resources in the next five to 10 years?

Healthcare: A local hospital manages the healthcare facilities for several towns. Where will a new center be needed the most in the next five to 10 years?

Environment: Environmentalists work to make sure that the habitat for wildlife in an area is not destroyed. If more people move there, the forest will be cut down to build new homes. How will they know if this will be a problem in the next five to 10 years?

In this exercise, you will be asked to simulate and make projections about the population growth of the United States. With these projections, you will be able to evaluate the results of different possible scenarios and interpret these changes.

OBJECTIVES

Evaluate the utility of population projections.

Organize information about modeling population change.

Analyze information about population projections and population growth change.

Describe different scenarios of population projections.

MATERIALS

- colored pencils (4 colors)
- graph paper

Procedure

PART I—SHORT-TERM PROJECTION

1. Review the components of population change described in your textbook.

a. What is the natural way a population grows?

b. What is the natural way a population declines?

c. What else causes a population to change size?

Modeling Population Changes *continued*

d. Write an equation for population change using the components listed above.

2. To predict the future size of a population, you need to know the current population size along with some assumptions about the components of change.

a. How can you find out the current population size?

b. What factors are used to predict future population change?

3. In this simulation, the approximate number of births, deaths, and migrants to the United States has been provided for the period from 2000 to 2005. Using a calculator, complete the table to predict the population size in the United States for 2005.

UNITED STATES POPULATION CHANGE FROM 2000–2005

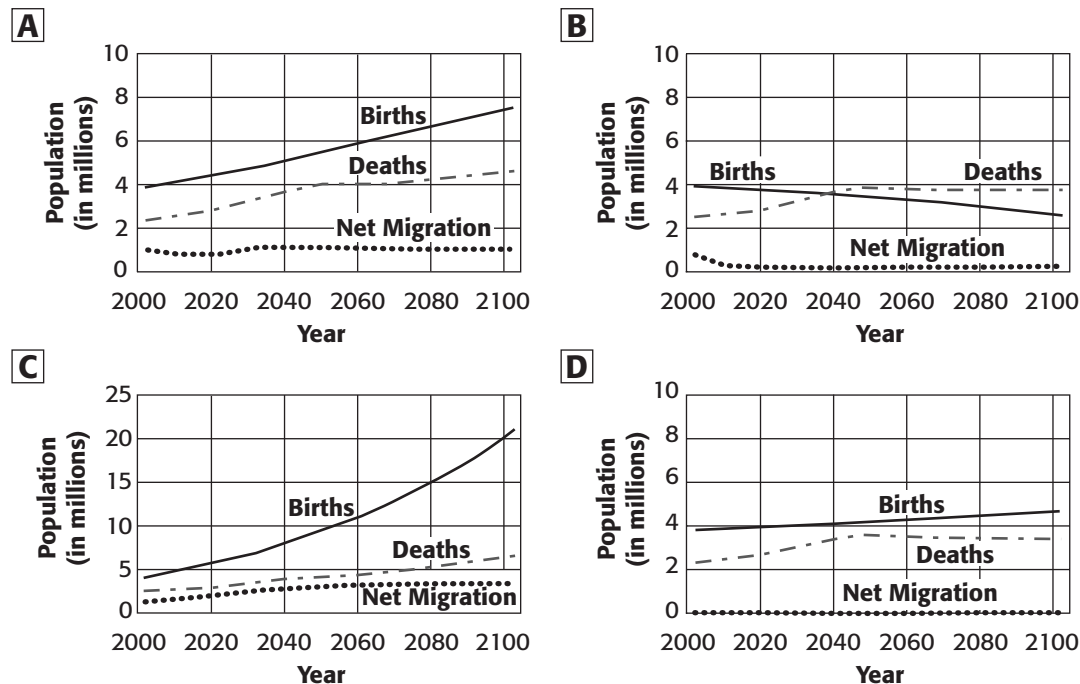
2000 Total Population (thousands)		Population Change from 2000–2005 (thousands)			2005 Total Population (thousands)	
Age	Population	+Births	–Deaths	+Migrants	Age	Population
		19,000	3	130	0–4	
0–4	18,800		2	260	5–9	
5–9	19,700		1	340	10–14	
10–14	19,900		1	570	15–19	
15–19	19,800		2	660	20–24	
20–24	18,500		2	690	25–29	
25–29	17,800		2	680	30–34	
30–34	19,500		3	460	35–39	
35–39	22,200		4	330	40–44	
40–44	22,600		6	230	45–49	
45–49	19,900		8	160	50–54	
50–54	7,200		10	120	55–59	
55–59	13,300		20	110	60–64	
60–64	10,600		30	90	65–69	
65–69	9,400		40	50	70–74	
70–75	8,700		60	20	75–79	
75–79	7,400		70	15	80–84	
80–84	4,900		80	5	85–89	
85+	4,300		150	1	90+	
Total (thousands)					Total (thousands)	

Modeling Population Changes *continued*

PART II—LONG-TERM PROJECTION

4. Because the assumptions about fertility, mortality, and migration are based in part on human behavior, predictions made by demographers are not always accurate. The level of uncertainty increases as the time period of the projection increases. For this reason, demographers use different scenarios that reflect variations in assumptions made about fertility, mortality, and migration. Examine the different scenarios of change for United States population growth shown in the figure below.

POSSIBLE COMPONENTS OF CHANGE OF U.S. POPULATION 2000–2100



Source: U.S. Census Bureau.

5. Which graph in the figure above would result in the greatest increase in population by the year 2100? the least increase?

Analysis

1. **Organizing Data** What was the total change projected in the U.S. population from 2000 to 2005?

Modeling Population Changes *continued*

- 2. Organizing Data** Which age group in 2000 had the greatest percentage increase by 2005?

- 3. Constructing Graphs** Using the four possible scenarios of change shown in the figure, create a graph on a separate sheet of paper that shows the four resulting projections of population change in the United States from 2000 to 2100. Use a different color pencil for each scenario. Use the total population for 2000 that you calculated in the table as a starting population.

Conclusions

- 4. Analyzing Graphs** What is the difference in the projected population of the United States in 2100 between the highest projection and the lowest projection? in 2060?

- 5. Drawing Conclusions** Explain why the difference in population projections increases over longer projection periods.

Extension

- 1. Research and Communications** Use information from the U.S. Census Bureau's International Data Base, available on the Internet or at your local library, to examine population projections for other countries or regions.