Lesson Summary

When data from a population are used to calculate a numerical summary, the value is called a *population characteristic*. When data from a sample are used to calculate a numerical summary, the value is called a *sample statistic*. Sample statistics can be used to learn about population characteristics.

Problem Set

1. The lunch program at Blake Middle School is being revised to align with the new nutritional standards that reduce calories and increase servings of fruits and vegetables. The administration decided to do a census of all students at Blake Middle School by giving a survey to all students about the school lunches.

   http://frac.org/federal-foodnutrition-programs/school-breakfast-program/school-meal-nutrition-standards

   a. Name some questions that you would include in the survey. Explain why you think those questions would be important to ask.

   b. Read through the paragraph below that describes some of the survey results. Then, identify the population characteristics and the sample statistics.

   > About $\frac{3}{4}$ of the students surveyed eat the school lunch regularly. The median number of days per month that students at Blake Middle School ate a school lunch was 18 days. 36% of students responded that their favorite fruit is bananas. The survey results for Tanya's seventh-grade homeroom showed that the median number of days per month that her classmates ate lunch at school was 22, and only 20% liked bananas. The fiesta salad was approved by 78% of the group of students who tried it, but when it was put on the lunch menu, only 40% of the students liked it. Of the seventh graders as a whole, 73% liked spicy jicama strips, but only 2 out of 5 of all the middle school students liked them.

2. For each of the following questions, (1) describe how you would collect data to answer the question, and (2) describe whether it would result in a sample statistic or a population characteristic.

   a. Where should the eighth-grade class go for its class trip?

   b. What is the average number of pets per family for families that live in your town?

   c. If people tried a new diet, what percentage would have an improvement in cholesterol reading?

   d. What is the average grade point of students who got accepted to a particular state university?

   e. What is a typical number of home runs hit in a particular season for major league baseball players?

3. Identify a question that would lead to collecting data from the given set as a population and a question where the data could be a sample from a larger population.

   a. All students in your school

   b. Your state

4. Suppose that researchers sampled attendees of a certain movie and found that the mean age was 17 years old. Based on this observation, which of the following would be most likely?

   a. The mean age of all of the people who went to see the movie was 17 years old.

   b. About a fourth of the people who went to see the movie were older than 51.

   c. The mean age of all people who went to see the movie would probably be in an interval around 17 years of age, that is, between 15 and 19.

   d. The median age of those who attended the movie was 17 years old as well.

5. The headlines proclaimed: "Education Impacts Work-Life Earnings Five Times More Than Other Demographic Factors, Census Bureau Reports." According to a U.S. Census Bureau study, education levels had more effect on earnings over a 40-year span in the workforce than any other demographic factor. www.census.gov/newsroom/releases/archives/education/cb11-153.html

   a. The article stated that the estimated impact on annual earnings between a professional degree and an eighth-grade education was roughly five times the impact of gender, which was $13,000. What would the difference in annual earnings be with a professional degree and with an eighth-grade education?

   b. Explain whether you think the data are from a population or a sample, and identify either the population characteristic or the sample statistic.

The History of the U.S. Census

The word *census* is Latin in origin and means to tax. The first U.S. census took place over 200 years ago, but the United States is certainly not the first country to implement a census. Based on archaeological records, it appears that the ancient Egyptians conducted a census as early as 3000 B.C.E.

The U.S. census is mandated by the U.S. Constitution in Article I, Section 2, which states, in part, "Representatives and direct Taxes shall be apportioned among the several States … according to their respective Numbers …. The Number of Representatives shall not exceed one for every thirty thousand, but each State shall have at Least one Representative …." The Constitution then specifies how to calculate the number of people in each state and how often the census should take place.

The U.S. census has been conducted every ten years since 1790, but as time has passed, our census has evolved. Not only have the types of questions changed but also the manner in which the data are collected and tabulated. Originally, the census had only a few questions, the purpose of which was to discern the number of people in each household and their ages. Presumably, these data were used to determine the number of men in each state who were available to go to war. Federal marshals were charged with the task of conducting this first census. After collecting data from their respective jurisdictions, the marshals sent the data to President Washington.

As time has passed, more questions have been added to the U.S. census. Today, the census includes questions designed to collect data in various fields such as manufacturing, commerce, and transportation, to name a few. Data that were once manually tabulated are now processed by computers. Home visits by census officials were once the norm, but now the census is conducted primarily through the U.S. Postal Service. Each household in the United States receives in the mail a copy of the census questionnaire to be completed by its head of household who then mails it back to the Census Bureau. Home visits are paid only to those individuals who do not return the questionnaire by the specified deadline.

The census is an important part of our Constitution. Today, the census not only tells us the population of each state, thereby determining the number of representatives that each state will have in the House of Representatives, but it also provides the U.S. government with very useful data that paint a picture of the current state of our population and how it has changed over the decades.

"U.S. Census History," *essortment*, accessed November 4, 2014, http://www.essortment.com/census-history-20901.html.