

Changes In The Survival Rate Of U.S. Population

76

Governments periodically take a census, or count, of the population. Data gathered in a census are analyzed and compared to previous censuses in order to determine trends occurring in a population. Types of data gathered include death rates and numbers of people surviving in each age group. This information can be used to plot a survivorship curve which shows the number of people surviving in each age group.

In this investigation, you will

- compare the death rate by age groups for a sample of the U. S. population in the late 19th century to that of a sample of the U. S. population in the early 20th century.
- prepare survivorship curves for both population groups.
- compare these survivorship curves and thus be able to describe changes that took place in the U. S. population between the 19th and 20th centuries.

Materials

colored pencils (or pens)

Procedure

Part A. Calculating 19th and 20th Century Population Data

Because it is so difficult to work with large numbers, we will work with only samples of the populations of both centuries. Table 76-1 uses a sample of 1000 people who lived in the late 19th century. What is true for these 1000 people is generally true for the entire population during the same period.

Column A of Table 76-1 lists by age groups the number of people out of 1000 who died during the late 19th century. (These numbers were gathered by checking tombstone dates in a cemetery.)

- Complete Table 76-1. Calculate the data for columns B and C. Column B is to be completed as follows. At the beginning of the age interval 0-10, all 1000 people are surviving. Thus, the first number in Column B is 1000. (This number is provided for you in the table.) To complete the number surviving in the other age groups, subtract the number dying (Column A) from the number surviving in the previous age group (Column B).

Example: Compute the number surviving at the start of age interval 11-20. Subtract the number of people who died in interval 0-10 (104) (Column A)

from the number surviving at the beginning of interval 0-10 (1000) (Column B). $1000 - 104 = 896$, the number of people surviving at the beginning of interval 11-20.

For the interval 21-30, repeat this process using the numbers from the interval 11-20 ($896 - 36 = 860$). Complete the rest of Column B in this manner.

- Complete Column C as follows: This column lists the average number of people alive throughout the age interval. Take half the value for each age group in Column A and subtract it from the number directly across from it in Column B. Example: For the age interval 0-10, divide 104 (from Column A) by 2 (52). Subtract this number from 1000 (Column B) to get 948 (Column C).

For the age interval 11-20, divide 36 (from Column A) by 2 (18). Subtract this number from 896 (Column B) to get 878 (Column C). Complete the rest of Column C in this way.

- Complete Table 76-2 just as you did Table 76-1. Table 76-2 shows the population data for an early 20th century U. S. population.

TABLE 76-1. LATE 19TH CENTURY SAMPLE POPULATION DATA (1850-1899)

AGE (YEARS)	A NUMBER DYING	B NUMBER SURVIVING AT START OF INTERVAL	C AVERAGE NUMBER ALIVE
0-10	104	1000	
11-20	36		
21-30	152		
31-40	116		
41-50	116		
51-60	132		
61-70	132		
71-80	124		
81-90	84		
91-100	4		
100 +	0		

TABLE 76-2. EARLY 20TH CENTURY SAMPLE POPULATION DATA (1900-1950)

AGE (YEARS)	A NUMBER DYING	B NUMBER SURVIVING AT START OF INTERVAL	C AVERAGE NUMBER ALIVE
0-10	20	1000	
11-20	32		
21-30	52		
31-40	28		
41-50	88		
51-60	156		
61-70	240		
71-80	268		
81-90	116		
91-100	0		
100 +	0		

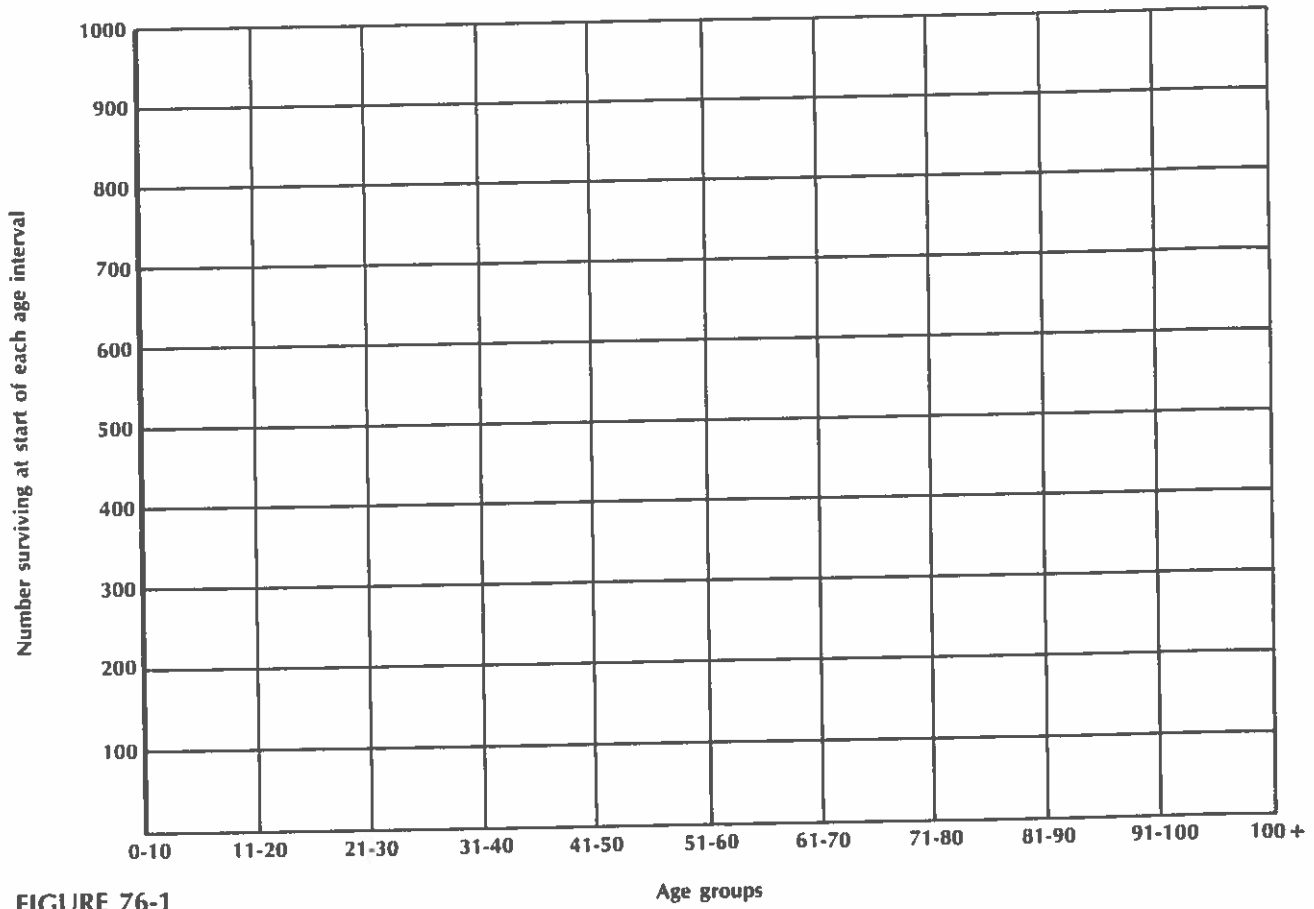


FIGURE 76-1

Age Interval	Century										
100+	20										
	19										
91-100	20										
	19										
81-90	20										
	19										
71-80	20										
	19										
61-70	20										
	19										
51-60	20										
	19										
41-50	20										
	19										
31-40	20										
	19										
21-30	20										
	19										
11-20	20										
	19										
0-10	20										
	19										

0 100 200 300 400 500 600 700 800 900 1000

FIGURE 76-2

Average number of people still alive in each age interval

● The average life span for a late 19th century U. S. population can be computed as follows: Total up all the numbers in Column C of Table 76-1. Divide this number by 100.

1. What was the average life span for a person living in the late 19th century? _____

● The average life span for a 20th century U. S. population can be computed as follows: Total up all numbers in Column C of Table 76-2. Divide this number by 100.

2. What was the average life span for a person living in the early 20th century? _____

Part B. Plotting a Survival Curve

● Construct a line graph on Figure 76-1 using the data from Column B in Tables 76-1 and 76-2. Make two lines on this graph using different colors for each century.

● Label the lines as to which century each represents.

Part C. Comparing Survival by Age Groups

Construct a bar graph on Figure 76-2 using the data from Column C in Tables 76-1 and 76-2. Use different colors for each century and label the graphs.

Analysis

1. Using Figure 76-1, tell which population's individuals had the best chance of surviving at the age of

(a) 11-20 years. _____

(b) 31-40 years. _____

(c) 71-80 years. _____

2. Why do you think that the early 20th century population shows a higher survival rate at almost every age group? _____

3. Using your graph which compares average number of people still alive in each age group (Figure 76-2),
 (a) list the age group showing the biggest difference between 19th and 20th century populations.

(b) list the age group showing the next biggest difference. _____

(c) list the age group showing the least difference (do not use the 90-100 or 100+ age groups). _____

4. When comparing average 19th and 20th century life spans, what trend seems to be occurring in the U. S. population? _____

5. Using the graph in Figure 76-3, predict and draw the survivorship curves for an early 19th century population and a late 19th century population.

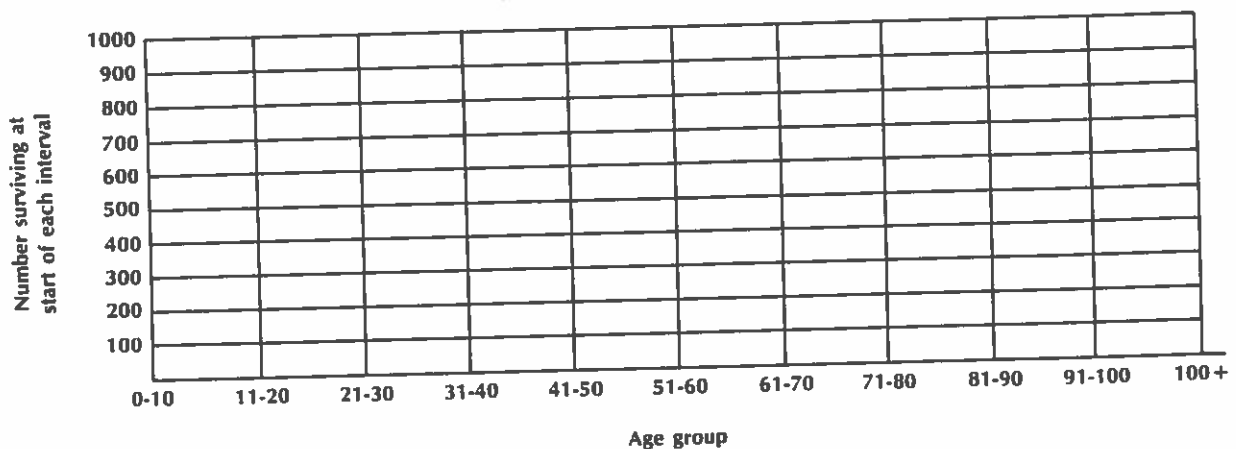


FIGURE 76-3

6. Using the graph in Figure 76-4, predict and draw the survivorship curves for an early 20th century population and a late 20th century population.

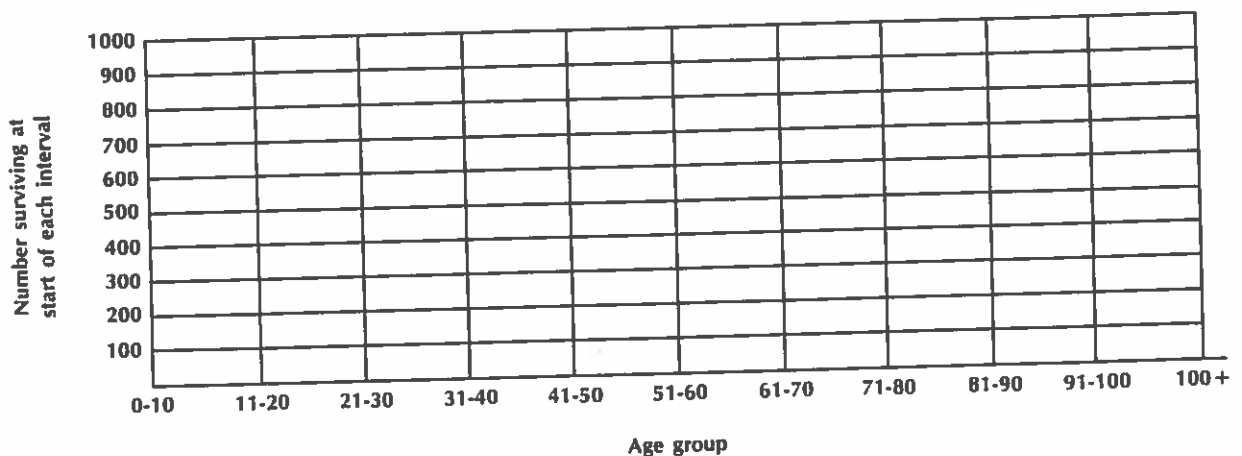


FIGURE 76-4