

Name \_\_\_\_\_  
Block \_\_\_\_\_ Date \_\_\_\_\_

## Human Population-Changes in Survival

### Objectives:

Throughout the world, humans are living longer. After this lab, the student will be able to:

1. Understand differences in human mortality and survivorship between past and modern times.
2. Understand how changes in human mortality and survivorship have influenced population growth.

### Introduction:

The survival rate of humans in North America has increased significantly in the past one hundred years. Improved nutrition, preventive medicine, lifestyle changes, and new technology are a few of the reasons for this improved life expectancy. Increasing life expectancies have had an impact on population growth rates. Put simply, there are more of us and we are living longer. In Rome during the first to fourth centuries, life expectancy was about 22 years at birth. Today life expectancy is approximately 75 years at birth in North America. Of particular note is the decline in infant and youth mortality in North America during the past hundred years.

### Relevance: Human Population

As more humans are living longer lives, they are placing additional and unique demands on the environment. With more babies surviving into adulthood, there are more potential parents, so that even if each adult female decides to have only two or three children, the sheer number of parents having children guarantees population growth. With the increased number of adults surviving to old age, environmental and social issues become increasingly important. The elderly must live in a clean environment, since they may be more vulnerable to pollution and environmental hazards. On the other hand, since retired adults often require social services and an income, many economists believe that an increase in population is necessary, to provide workers that can support those who have retired. But it is clear that an increased population places increased stress on an often overburdened environment. Thus, some type of balance between environmental and economic interests must be reached when dealing with population issues.

### Activity:

You will be given two sets of data, with numbers of deaths by age. The first set, representing vital statistics for individuals that died before 1940. The second set, representing current mortality figures, will be obtained for deaths after 1940.

To determine the survival curve, use the following method. You will have four sets of data, 100 pre-1940 males, 100 post-1940 males, 100 pre-1940 females, and 100 post-1940 females. You can determine the number surviving to each age for each of the four groups by using the following technique. You can convert your raw data into a percentage by dividing the number that died in each age group by the total number in the category.

**Procedure:**

1. Determine the percent surviving by using the example below.
2. Plot the data on a graph (survival curve) for both males and females for the two time periods.  
Use 4 different colored pencils for the two time periods and males and females.
3. Analyze the data and the reasons for change.

**Example:**

Age at death (years)	Number that died	Percent surviving
0	0	$200-0=200$ *plot this # on the graph percent = 100
0-.99	10	$200-10=190$ percent = 95
1-4.99	15	$190-15=175$ percent = 87.5
5-9.99	12	$175-12=163$ percent = 81.5

Use the data to graph a survival curve for each of the four groups:

Pre-1940 females

Post-1940 females

Pre-1940 males

Post-1940 males

Use different colored pens or pencils to record each of the sets of data on the graph.

Place age on the x-axis and percent surviving on the y-axis

**Analysis:**

1. Give two reasons why there is a difference in the pre-1940 males and females.
2. Give two reasons why there is a difference in the post-1940 males and females.
3. Give three reasons why there is a difference between pre and post percent survivorship.
4. Compare the pre and post data by using the graph in your explanation.
5. Contrast the pre and post data by using the graph in your explanation.

Data tale 1: Pre-1940

Age at death (years)	Males		Females	
	Number that died	Percent surviving	Number that died	Percent surviving
	0	100	0	100
0-.99	12		19	
1-4.99	20		13	
5-9.99	6		8	
10-14.99	4		4	
15-19.99	7		8	
20-24.99	4		13	
25-29.99	3		9	
30-34.99	13		14	
35-39.99	9		8	
40-44.99	13		25	
45-49.99	12		6	
50-54.99	14		13	
55-59.99	17		9	
60-64.99	16		12	
65-69.99	22		19	
70-74.99	20		12	
75-79.99	20		15	
80-84.99	9		9	
85-89.99	5		8	
90-94.99	1		4	
95-99.99	1		3	
100+	0		1	

Total                    228

233

Data tale 1: Post-1940

Age at death (years)	Males		Females	
	Number that died	Percent surviving	Number that died	Percent surviving
	0	100	0	100
0-.99	6		7	
1-4.99	1		1	
5-9.99	1		1	
10-14.99	1		2	
15-19.99	1		1	
20-24.99	3		1	
25-29.99	2		1	
30-34.99	2		1	
35-39.99	3		2	
40-44.99	2		2	
45-49.99	6		1	
50-54.99	7		3	
55-59.99	14		8	
60-64.99	14		11	
65-69.99	16		9	
70-74.99	14		11	
75-79.99	20		12	
80-84.99	18		24	
85-89.99	12		17	
90-94.99	4		7	
95-99.99	3		2	
100+			1	

Total 150

125