

## **Drowning Exercise**

### **Purpose**

This exercise uses the analysis of data to explore the risk factors for unintentional drowning.

### **Overview**

In groups or as individuals, students evaluate data by using math and basic statistics (including graphs) to explore the possible risk factors for drowning. They summarize their data and recommend prevention interventions. These results can be presented orally by individuals or groups. As an extension exercise, students can perform additional research on established and possible risk factors for unintentional drowning and near drowning.

### **Time**

1 two-hour block class period or can be broken up with homework calculations. The results can be written up and/or presented verbally in class.

### **Key Concepts**

Examination of statistical data can lead to the formation of hypotheses concerning the causes of mortality. Data can be examined by statistical analysis and graphing.

### **Skills**

Data analysis

Graphing data

Hypothesis formation

Statistical Data interpretation

### **Materials**

Handheld calculators

Internet access important although the activity can be done without it. Computer access to spreadsheet and graphing software such as Excel would be useful, but not essential

since tables and graphs can be created by hand. Powerpoint or similar software may be useful in the oral presentation of results.

### **Facilitator Preparation**

If you want this Exercise done as a group activity, you will need to divide the students into groups or teams. Prior knowledge of unintentional drowning can be found at the online National Center for Injury Prevention & Control (CDC) Drowning Fact Sheet at: [www.cdc.gov/ncipc/factsheets/drown.htm](http://www.cdc.gov/ncipc/factsheets/drown.htm). And will prepare you for the range of issues addressed in this section.

Teachers can meet with each group to evaluate their progress in collecting information and deciding on formulating the graphing, and analyzing the data, as well as formulating and substantiating hypotheses, and subsequent oral presentations.

### **Background**

Epidemiology is the study the patterns and risk of diseases and exposures in populations. Statistics/Biostatistics is the study of numerical data to evaluate the patterns and risks of disease.

Drowning is defined as death within 24 hours of immersion in liquid, either due to anoxia or cardiac arrest caused by sudden extreme lowering of temperature (immersion syndrome). Unintentional means accidentally without suicidal or homicidal intent. Both unintentional drowning and near drowning are significant causes of death for young people in the US, particularly young black males.

### **Procedure**

Students should be given the following worksheets as individuals or groups to work either independently or as a class directed exercise. Written answers can be handed in and/or presented orally.

### **Resources**

Centers for Disease Control and Prevention. Web-based Injury Statistics Query and Reporting System (WISQARS) [Online]. (2002). National Center for Injury Prevention and Control, Centers for Disease Control and Prevention (producer). Available from: URL: [www.cdc.gov/ncipc/wisqars](http://www.cdc.gov/ncipc/wisqars). [2003 Jan].

Drowning prevention. National Center for Injury Prevention & Control (CDC). Home page (online). Available at: [www.cdc.gov/ncipc/factsheets/drown.htm](http://www.cdc.gov/ncipc/factsheets/drown.htm).

### **Follow-up Activities**

- Students can go to the Centers for Disease Control and Prevention (CDC) Web-based Injury Statistics Query and Reporting System (WISQARS) [Online] at

[www.cdc.gov/ncipc/wisqars](http://www.cdc.gov/ncipc/wisqars) to evaluate statistics and risk factors for unintentional non fatal “near-drowning” as well as further exploration of drowning and other causes of fatal injury.

- Students can research the known and suspected risk factors for drowning and “near drowning,” and possible prevention interventions through a library and web search, and the prepare a written and/or oral presentation in groups or as individuals
- Class field trip to the local Public Health Department and talk with an epidemiologist (a physician or public health scientist who studies diseases and exposures at the population level).
- Class presentation by groups such as the Red Cross who teach CPR and other rescue/safety techniques to prevent drowning and near drowning.
- Students can create educational materials (brochures, videos, fact sheets, posters) on drowning/near drowning, risk Issues and prevention

### **Student Assessment**

Give the following components to each student team as a guide:

- ❖ As individuals or in groups, read the enclosed Drowning Exercise, answering the questions using full written sentences
- ❖ Formulate written hypotheses as to the populations and risk factors
- ❖ Create population rates from the data provided and evaluate
- ❖ Table and graph the data and evaluate
- ❖ Decide if the results are consistent or not with the hypotheses, and why
- ❖ Present the data and results as written and/or oral presentation
- ❖ If performed in groups, each group member should take part in the Presentation, even if it is just to read or explain one piece of the presentation
- ❖ Each group member should answer at least one question from the audience at the end of their Group presentation.

Assign points for the following components of the Team Project:

- ❖ Were the original hypotheses clearly formulated?
- ❖ Are the tables appropriately constructed and formulated?
- ❖ Were the graphs appropriate constructed?
- ❖ If preformed in a group, were data interpreted by all members of the Team?
- ❖ Were proper science terms used in the written interpretation of the hypotheses?
- ❖ If a presentation was made, was each group member actively involved in the presentation?

## Drowning Exercise

In the year 2000, there were 3,482 unintentional drownings in the United States, an average of nine people per day. This does not include those who drowned in boating-related incidents (CDC 2002).

1. Define unintentional drowning?
2. Based on Table 1 below, for which age groups is unintentional drowning one of the top 3 causes of death. and why?

**Table 1. Ten Leading Causes of Injury Deaths  
by Age Group - 1998, U.S.**

(<http://www.tf.org/tf/injuries/98death-cause.html>)

Rank	<1 yrs	1-4 yrs	5-9 yrs	10-14 yrs	15-24 yrs	Total yrs
1	Unintentional Suffocation 376	Unintentional MV Traffic 627	Unintentional MV Traffic 794	Unintentional MV Traffic 987	Unintentional MV Traffic 9,828	Unintentional MV Traffic 42,191
2	Other Homicide 253	Unintentional Drowning 496	Unintentional Drowning 243	Unintentional Drowning 201	Firearm Homicide 4,559	Firearm Suicide 17,424
3	Unintentional MV Traffic 158	Unintentional Fire/Burn 264	Unintentional Fire/Burn 197	Firearm Homicide 194	Firearm Suicide 2,510	Other Unintentional 13,984
4	Other External 75	Other Homicide 255	Other Unintentional 75	Firearm Suicide 153	Suffocation Suicide 1,049	Unintentional Falls 12,595
5	Unintentional Drowning 63	Unintentional Suffocation 152	Unintentional Suffocation 61	Suffocation Suicide 148	Unintentional Poisoning 860	Firearm Homicide 12,102
6	Other Unintentional 61	Unintentional MV NonTraffic 132	Firearm Homicide 60	Other Unintentional 119	Unintentional Drowning 821	Unintentional Poisoning 10,801
7	Unintentional Fire/Burn 43	Other Unintentional 93	Other Homicide 47	Unintentional Fire/Burn 104	Other Unintentional 551	Suffocation Suicide 5,726
8	Suffocation Homicide	Firearm Homicide	Unintentional MV	Unintentional Suffocation	Cut/Piercing Homicide	Poisoning Suicide

	36	58	NonTraffic 40	72	468	5,072
9	Unintentional Falls 20	Unintentional Falls 45	Unintentional Firearm 34	Unintentional Firearm 68	Poisoning Suicide 300	Unintentional Suffocation 4,585
10	Unintentional Natural/Env. 15	Other External 42	Unintentional Natural/Env. 27	Unintentional MV NonTraffic 47	Other Homicide 281	Unintentional Drowning 4,406

3. Which States do you think (hypothesize) might have the highest risk of drowning deaths and why?

Use the data in the Table 2 below to evaluate the following questions about drowning in the United States.

Table 2. Number Drownings in 1999-2001

State	Number of people drowned	Population at risk
Illinois	308	37,298,540
Georgia	369	24,638,095
Florida	987	48,115,129
Arizona	268	15,461,421
Connecticut	83	10,226,568
California	1,163	101,971,315
Kansas	85	8,068,881

source: [http://webappa.cdc.gov/sasweb/ncipc/mortrate10\\_fy.html](http://webappa.cdc.gov/sasweb/ncipc/mortrate10_fy.html)

4. Which State reported the greatest number of people drowning (use Table 2a to order the states in the correct rank)?

Table 2a. Rank, and Number of Drownings in 1999-2001

Rank of Drowning Risk	State	Number of people drowned
1		
2		
3		
4		
5		
6		
7		

5. Which States have the highest population at risk for drowning (use Table 2b to order the states in the correct rank)?

Table 2b. Rank, and Population at risk for Drownings in 1999-2001

Rank of Drowning Risk	State	Population at Risk
1		
2		
3		
4		
5		
6		
7		

6. Using the data in Table 2, calculate the rates of drowning (ie. number of people drowned divided by the number of people at risk during some time period).

Table 2c. Number and Rates (100,000 persons) of Drowning in 1999-2001

State	Number of people drowned	Population at risk	Rate per 100,000 persons
Illinois	308	37,298,540	
Georgia	369	24,638,095	
Florida	987	48,115,129	
Arizona	268	15,461,421	
Connecticut	83	10,226,568	
California	1,163	101,971,315	
Kansas	85	8,068,881	

source: [http://webappa.cdc.gov/sasweb/ncipc/mortrate10\\_fy.html](http://webappa.cdc.gov/sasweb/ncipc/mortrate10_fy.html)

7. Graph the data of both numbers and rates to show the numbers and rates of drownings by the different states.

8. Which State had the highest rate of people drowning (use Table 2d to order the states in the correct rank)?

Table 2d. Rank and Rates (100,000 persons) of Drownings in 1999-2001

Rank of Drowning Risk	State	Rate per 100,000 persons
1		
2		
3		
4		
5		
6		
7		

9. If there is a difference in the rankings of the states between these answers (ie. numbers of drownings vs population at risk vs rates of drownings), explain why.

Between 1999-2001, there were a total of 987 unintentional drowning deaths in Florida among 48,115,129 Florida residents. Go to the Centers for Disease Control and Prevention (CDC) Web-based Injury Statistics Query and Reporting System (WISQARS) [Online] at [www.cdc.gov/ncipc/wisqars](http://www.cdc.gov/ncipc/wisqars) to evaluate additional risk factors for unintentional drowning. Go to “Fatal Injury Reports” then to “Data from 1999 and later” then “Output by 5 year Age Groups” to create an Injury Report of Unintentional Drowning for 1999-2001 for Florida.

Use the menu to create your injury report at [http://webappa.cdc.gov/sasweb/ncipc/mortrate10\\_fy.html](http://webappa.cdc.gov/sasweb/ncipc/mortrate10_fy.html) by the following variables:

- Unintentional
- Drowning
- State: Florida only
- Years: 1999-2001

Otherwise keep the default selections as they are.

Under the Advanced Options, select the following “select output groups”:

- Gender
- Age Group
- Race

Fill in Table 3 below for Florida Unintentional Drownings between 1999-2001 by Gender, Age (0-24 in 5 year age groups) and Race.

Table 3. Unintentional drownings in Florida between 1999-2001

<b>Gender</b>	<b>Age Group</b>	<b>Race</b>	<b>Number of Deaths</b>	<b>Rate/100,000/yr</b>	
<b>Female</b>	<b>0-4</b>	<b>White</b>			
		<b>Black</b>			
	<b>5-9</b>	<b>White</b>			
		<b>Black</b>			
	<b>10-14</b>	<b>White</b>			
		<b>Black</b>			
	<b>15-19</b>	<b>White</b>			
		<b>Black</b>			
	<b>20-24</b>	<b>White</b>			
		<b>Black</b>			
	<b>Male</b>	<b>0-4</b>	<b>White</b>		
			<b>Black</b>		
<b>5-9</b>		<b>White</b>			
		<b>Black</b>			
<b>10-14</b>		<b>White</b>			
		<b>Black</b>			
<b>15-19</b>		<b>White</b>			
		<b>Black</b>			
<b>20-24</b>		<b>White</b>			
		<b>Black</b>			

10. Based on the rates of drownings, who is more at risk of drowning in Florida: males or females, and why?

11. Based on the rates of drownings, what age groups are most at risk of drowning, and why?

12. Based on the rates of drownings, who is more at risk of drowning: Blacks or Whites, and why?

Based on what you have learned from the data you have just analyzed for Florida, write a brief summary of your results, what other information you would like to know, and recommend possible targeted prevention recommendations to prevent unintentional drownings in Florida.