Statistics Tool for Social Research (Canadian) 4th edition Healey Solutions Manual

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CHAPTER 1

INTRODUCTION

SUMMARY

Statistics: A Tool for Social Research, Fourth Canadian Edition, begins by explaining the role of statistics in the research process. The discussion is guided by "The Wheel of Science," as conceptualized by Walter Wallace (Figure 1.1). The text consistently presents statistics in the context of the research enterprise; that is, statistics are always presented not as ends in themselves, but as useful devices or tools for answering questions and testing theories.

The chapter also distinguishes between descriptive and inferential statistics, and between univariate, bivariate, and multivariate statistics. The distinction between discrete and continuous variables and the concept of level of measurement are presented as well. The latter is stressed throughout the text as an organizational device and as a major criterion for selecting statistics appropriately. Exercises are provided at the end of the chapter for reviewing the characteristics of the three levels of measurement used in this text.

NEW TO THE FOURTH CANADIAN EDITION

The SPSS section has been revised to introduce students to SPSS and the survey data, 2013 Canadian General Social Survey (GSS) and 2012 Canadian Community Health Survey (CCHS), used in the SPSS demonstration and exercises.

WHAT CAN I DO IN CLASS?

1. Provide students with a table consisting of a variable (Column 1), the variable's response categories (Column 2), whether it is independent or dependent (Column 3), and level of measurement (Column 4). Ask students to identify the variables as ***independent*** or ***dependent*****,** as well as the ***level of measurement*** for each given variable. Go over the answers in class. For example, Gender is an independent variable, and Education can be either independent or dependent, depending on whether it is measured as a continuous variable or reported as categorical (number of years of schooling versus high school, college diploma, university degree, etc.).

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2. Show a list of examples of populations and samples, and have students identify each as such. For example, we want to know if more male students or more female students visit the local pub on campus in a given week.

    a. Sample: The number of male and female visitors you observe visiting during a one-hour period
    b. Population: Everyone who visits the local pub on campus in a given week

WHAT CAN I DO ONLINE?

1. Have students look up examples online of variables that can be identified as having more than one level of measurement, depending on how they are categorized. For example, household income can be reported as a continuous variable or grouped into finite categories (as shown in Statistics Canada PUMF). For example, see http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/famil106a-eng.htm.

2. Have students search a recent news story and identify and list variables that could be used to conduct a quantitative analysis. For example, in the December 2015 launch of a national public inquiry into missing and murdered Indigenous women and girls, gender was a major issue, and so was Indigenous identity, violence against women and girls, public protests, and political policy decisions. See http://news.gc.ca/web/article-en.do?nid=1023999.

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CHAPTER

2

BASIC DESCRIPTIVE STATISTICS:

Percentages, Ratios and Rates, Tables, Charts, and Graphs

SUMMARY

This chapter covers relatively simple descriptive devices: percentages and proportions, ratios, rates, frequency distributions, pie and bar charts, histograms, and frequency polygons. The emphasis is on frequency distributions and the construction and interpretation of these tables for variables measured at each of the three different levels. Instructors may want to supplement this material with additional examples of each technique and/or graphs and charts, especially those created by software such as Microsoft Excel.

The underlying "theme" of this chapter is the need to present results clearly, to communicate results accurately and concisely but without losing too much detail. The problem used in Section 2.6: Charts and Graphs, for example, is intended to contrast the anarchy of raw, unorganized data with the clarity and simplicity of frequency distributions and various graphs.

NEW TO THE FOURTH CANADIAN EDITION

Most tables, graphs, and application boxes have been updated to better reflect the underlying relevance and importance of using basic descriptive statistics to help understand society. The SPSS exercises have been updated to reflect the new Canadian survey data used in the textbook.

ANSWERS TO TEXT PROBLEMS

2.1

a. Complex A: (5/20) × 100 = 25.00%
Complex B: (10/20) × 100 = 50.00%

b. Complex A: 4:5 = 0.80
Complex B: 6:10 = 0.60

c. Complex A: (0/20) = 0.00
Complex B: (1/20) = 0.05

d. (6/(4 + 6)) = (6/10) = 60.00%

e. Complex A: 8:5 = 1.60
Complex B: 2:10 = 0.20

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2.2

a. 42.36% (**see below for detailed solution**)
b. 0.47 (**see below for detailed solution**
c. 1.41 (**see below for detailed solution**)
d. 52.84%
e. 1.12
f. 0.08
g. 25.47%
h. 0.68
i. 3.97
j. 0.06

2.3 Bank robbery rate = (47/211,732) × 100,000 = 22.20
Homicide rate = (13/211,732) × 100,000 = 6.14
Auto theft rate = (23/211,732) × 100,000 = 10.86

2.4

State	**1997**	**2008**
New Jersey	4.20	4.23
Iowa	1.82	2.53
Alabama	10.29	7.23
Texas	6.83	5.65
California	7.99	5.83

Province	**1997**	**2008**
Nova Scotia	2.56	1.28
Quebec	1.80	1.19
Ontario	1.56	1.36
Manitoba	2.72	4.48
British Columbia	2.90	2.67

2.5 Answers may vary.

2.6 Answers may vary.

2.7 Answers may vary.

2.8 Answers may vary.

2.9 Answers may vary.

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2.10

Response Time, 2000	**Frequency (*f*)**	**Percentage**
21 minutes or more	35	3.72
16–20 minutes	75	7.98
11–15 minutes	180	19.15
6–10 minutes	375	39.89
Less than 6 minutes	275	29.26
	940	100.00

Response Time, 2010	**Frequency (*f*)**	**Percentage**
21 minutes or more	45	5.03
16–20 minutes	95	10.61
11–15 minutes	155	17.32
6–10 minutes	350	39.11
Less than 6 minutes	250	27.93
	895	100.00

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DETAILED SOLUTIONS TO SELECTED TEXT PROBLEMS

2.2

a. Social science majors = 97 + 132 = 229

Male social science majors = 97

% of social science majors who are male:

$$= \left(\frac{f}{n}\right) \times 100$$

$$= \left(\frac{97}{229}\right) \times 100$$

$$= (0.4236) \times 100$$

$$= 42.36\%$$

b. Business majors = 156 + 139 = 295

Female business majors = 139

Proportion of business majors who are female:

$$= \frac{f}{n}$$

$$= \frac{139}{295}$$

$$= 0.47$$

c. For humanities: number of males = 117

number of females = 83

Ratio of males to females:

$$Ratio = \frac{f_1}{f_2}$$

$$Ratio = \frac{117}{83}$$

$$Ratio = 1.41$$

2.3 Homicide rate:

Number of homicides = 13

Population = 211,732

$$\text{Homicide rate} = \frac{13}{211732} \times 100,000 = (0.0000614) \times 100,000 = 6.14$$

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WHAT CAN I DO IN CLASS?

1. Pass out a sheet of paper in class and have students write down their gender and the academic school year in which they are currently enrolled. Display the results for the entire class and have students decide what type of distribution would best depict the results. For example:

Gender	Academic Year
female	1
female	2
male	1
female	3
male	2
male	1
male	1
female	1
male	2
female	3
female	3
female	4
female	2
female	1
female	1
female	1
female	2
female	2
female	1
male	3

2. Provide students with a column of intervals and have them write out the real limits and midpoints for each interval. This will help familiarize them with statistical definitions.

Class Interval	Frequency	Real Limits
17–18	7	16.5–18.5
15–16	15	14.5–16.5

Therefore, when we subtract the real lower limit from the real upper limit, we get the actual width of the interval, which in this case is 2.

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WHAT CAN I DO ONLINE?

1. Using the Statistics Canada website (http://www.statcan.gc.ca), have students locate a summary table (e.g., "Earnings, average weekly, by province and territory"). Using this table, students can create a bar chart comparing Canada's average weekly earnings across one or more provinces. To simplify this exercise, have students round the numbers to the nearest whole number. Use http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/govt19a-eng.htm.

2. Find examples of news stories, and show how statistics are used to strengthen those stories. Example: http://business.financialpost.com/news/economy/feeling-the-brexit-bite-these-are-the-canadian-sectors-hurt-hardest-by-u-k-vote-to-leave-the-eu.

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Part 1 Cumulative Exercises

1. To what extent do people apply religion to the problems of everyday living? Fifteen people have responded to a series of questions, including the following:

1. What is your religious preference?

    1. Protestant
    2. Catholic
    3. Jewish
    4. Muslim
    5. Other
    6. None

2. On a scale of 1 to 10 (with 10 being the highest), how strong would you say your faith is?

3. How many times a day do you pray?

4. When things aren't going well, my religion is my major source of comfort.

    1. Strongly agree
    2. Slightly agree
    3. Neither agree nor disagree
    4. Slightly disagree
    5. Strongly disagree

5. How old are you?

The scores of 15 respondents are reproduced below.

Case	Religion	Strength	Pray	Comfort	Age
1	1	2	0	2	30
2	4	8	1	1	67
3	1	8	3	1	45
4	5	6	0	1	43
5	3	9	3	1	32
6	3	3	0	3	18
7	6	0	0	5	52
8	5	9	6	1	37
9	1	5	0	2	54
10	2	8	2	1	55
11	2	3	0	5	33
12	1	6	1	3	45
13	1	8	2	2	37
14	4	7	2	1	50
15	5	9	1	1	25

For each variable, construct a frequency distribution and calculate appropriate measures of central tendency and dispersion. Write a sentence summarizing each variable.

2. A survey measuring attitudes toward same-sex marriage was administered to 1,000 people. The survey asked the following questions:

1. What is your age?

2. What is your sex?

    1. Male
    2. Female

3. Marriages between people of the same sex do not work out and should be banned by law.

    1. Strongly agree
    2. Agree
    3. Undecided
    4. Disagree
    5. Strongly disagree

4. How many years of schooling have you completed?

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5. Which category below best describes the place where you grew up?

1. Large city
2. Medium-sized city
3. Suburbs of a city
4. Small town
5. Rural area

6. What is your marital status?

1. Married
2. Separated or divorced
3. Widowed
4. Never married

The scores of 20 respondents are reproduced below.

Case	Age	Sex	Attitude on Same-Sex Marriage	Years of School	Area	Marital Status
1	17	1	5	12	1	4
2	25	2	3	12	2	1
3	55	2	3	14	2	1
4	45	1	4	12	3	1
5	38	2	1	10	3	1
6	21	1	5	16	5	1
7	29	2	2	16	2	2
8	30	2	1	12	4	1
9	37	1	1	12	2	1
10	42	2	4	18	5	4
11	57	2	4	12	2	3
12	24	2	2	12	4	1
13	27	1	5	18	3	2
14	44	1	5	15	1	1
15	37	1	1	10	5	4
16	35	1	4	12	4	1
17	41	2	2	15	3	1
18	42	2	1	10	2	4
19	20	2	4	16	1	4
20	21	2	5	16	1	4

a. For each variable, construct a frequency distribution and select and calculate an appropriate measure of central tendency and a measure of dispersion. Summarize each variable in a sentence. Create a boxplot for each of the variables “Age” and “Years of school”.

b. For all 1,000 respondents, the mean age was 34.70 with a standard deviation of 3.4 years. Assuming the distribution of age is approximately normal, compute *Z* scores for each of the first 10 respondents above and determine the percentage of the area below (younger than) each respondent.

3. The data from 25 respondents shown below are taken from a social survey administered to adults. Abbreviated versions of the survey questions, along with the meanings of the codes, are also presented. For each variable, construct a frequency distribution, then select and calculate an appropriate measure of central tendency and a measure of dispersion. Summarize each variable in a sentence. Create a boxplot for each of the variables “Number of Children” and “TV Hours”.

1. How many children have you ever had? (Values are actual numbers.)

2. Respondent’s educational level:

0. Less than high school
1. High school diploma
2. Diploma/certificate from community college or trade school
3. Bachelor’s degree
4. Graduate degree

3. Sex

1. Male
2. Female

4. It is sometimes necessary to discipline a child with a good, hard spanking.

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1. Strongly agree
2. Agree
3. Disagree
4. Strongly disagree

5. Number of hours of TV watched per day. (Values are actual numbers of hours.)

6. What is your age?

1. Less than 35 years
2. 35 to 54 years
3. 55 or more years

Case	Number of Children	Years of School	Sex	Attitude on Spanking	TV Hours	Age
1	3	1	1	3	3	1
2	2	0	1	4	1	1
3	4	2	1	2	3	1
4	0	3	1	1	2	1
5	5	1	1	3	2	1
6	1	1	1	3	3	1
7	9	0	1	1	6	1
8	6	1	2	3	4	1
9	4	3	1	1	2	3
10	2	1	2	1	1	1
11	2	0	1	2	4	1
12	4	1	2	1	5	2
13	0	1	1	3	2	2
14	2	1	1	4	2	1
15	3	1	2	3	4	1
16	2	0	1	2	2	1
17	2	1	1	2	2	1
18	0	3	1	3	2	1
19	3	0	1	3	5	2
20	2	1	2	1	10	1
21	2	1	1	3	4	1
22	1	0	1	3	5	1
23	0	2	1	1	2	2
24	0	1	1	2	0	3
25	2	4	1	1	1	2

Answers to Odd-Numbered Cumulative Exercises

1. The level of measurement is the most important criteria for selecting descriptive statistics. The table below presents all relevant statistics for each variable. Statistics which are not appropriate for a variable are noted with an "X." Religion is nominal so the only statistics available are the mode and the variation ratio (*v*). For the two ordinal-level variables ("strength" and "comfort"), the median and the range are the appropriate choices. For interval-ratio variables like "pray" and "age," the mean and standard deviation are the preferred summary statistics.

Level of Measurement	Religion (Nominal)	Strength (Ordinal)	Pray (I-R)	Comfort (Ordinal)	Age (I-R)
Mode	Protestant				
Median	X	7		1	
Mean	X	X	1.40	X	41.53
IQV	0.95				
Range	X	9	4		
Stnd. dev.	X	X	1.62	X	12.54

3. As always, the level of measurement is the primary guideline for choosing descriptive statistics and the most appropriate statistics are noted in the table below. Statistics which are not appropriate for a variable are noted with an "X."

Level of Measurement	Children (I-R)	School (Ordinal)	Sex (Nominal)	Spanking (Ordinal)	TV (I-R)	Age (Ordinal)
Mode			Male			
Median		1.00	X	2 1		
Mean	2.44	X	X	X	3.08	X
IQV			0.32			
Range		4	X	3		2

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Stnd. dev.	2.06	X	X	X	2.04	X	