Chapter 1
INTRODUCTION

New to this Edition

- Updated "Statistics in Everyday Life" boxed inserts
- Added "Statistics in Everyday Life: Push Polls"
- Reduced "Becoming a Critical Consumer" by about 200 words
- Divided "A Journey Through the Research Process" into more obvious sub-sections
- Added Table 1.1 to provide examples of nominal-level variables
- Added Table 1.2 to clarify criteria for stating categories of variables
- Added Table 1.4 to clarify categories for ordinal-level variables

Learning Objectives: By the end of this chapter, students will be able to

1. Describe the limited but crucial role of statistics in social research
2. Distinguish between three applications of statistics (univariate descriptive, bivariate descriptive, and inferential) and identify situations in which each is appropriate
3. Identify and describe three levels of measurement and cite examples of variables from each.

Chapter Summary

The text 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 always presents statistics in the context of the research enterprise. That is, statistics are presented as useful tools for answering sociological questions and testing social science theories, never as ends in themselves.

The chapter also distinguishes between descriptive and inferential statistics and univariate, bivariate, and multivariate statistics. The concept of level of measurement is presented in this chapter and is stressed throughout the text as the 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.

Multiple Choice Questions

1. In social research the purpose of statistics is to
    a. prove that the research theory is correct
    b. validate the research project design
    c. manipulate and analyze data
    d. ensure acceptance by the scientific community
    Answer: c Page: 2

2. Without statistics, _____ research would be impossible.
    a. meaningful
    b. important
    c. qualitative
    d. quantitative
    Answer: d Page: 2

3. Data is the same thing as
    a. information collected in numerical form
    b. information collected in any form
    c. statistics
    d. proof
    Answer: a Page: 2

4. According to the "Wheel of Science," research projects begin
    a. with theory
    b. with data
    c. with an hypothesis
    d. at any stage on the Wheel
    Answer: d Page: 2

5. In the research process, theory
    a. is unnecessary
    b. is always fully developed before any data is gathered
    c. is developed only after the data have been completely analyzed
    d. is an attempt to explain the relationship between phenomenon
    Answer: d Page: 3

6. In the language of science, a variable that is thought to be causal is called
    a. an independent variable
    b. a hypothetical variable
    c. a primary variable
    d. a dependent variable
    Answer: a Page: 4

7. In time, the _____ variable precedes the _____ variable.
    a. hypothetical, theoretical
    b. empirical, quantitative
    c. independent, dependent
    d. dependent, independent

    Answer: c Page: 4

8. If people who eat at fast food restaurants become obese, obesity is
    a. an independent variable
    b. a causal variable
    c. a dependent variable
    d. none of the above

    Answer: c Page: 4

9. If people who habitually drive over the speed limit have more fatal accidents, then speed is
    a. an independent variable
    b. the dependent variable
    c. an effect or result variable
    d. none of the above

    Answer: a Page: 4

10. In terms of the Wheel of Science, an hypothesis is derived from _____ and leads to _____.
    a. statistics, observation
    b. theory, generalizations
    c. observation, generalizations
    d. theory, observation

    Answer: d Page: 4

11. An hypothesis states, in part, that "income increases as education increases". In this statement, income is
    a. the dependent variable
    b. the independent variable
    c. the hypothetical variable
    d. the secondary variable

    Answer: a Page: 4

12. An hypothesis states, in part, that "income increases as education increases". In this statement, education is
    a. the dependent variable
    b. the independent variable
    c. the hypothetical variable
    d. the secondary variable

    Answer: b Page: 4

13. An hypothesis differs from a theory in that
    a. it is "testable"
    b. it is true
    c. it is more speculative
    d. it is more abstract

    Answer: a Page: 4

14. A theory differs from an hypothesis in that it is more
    a. testable
    b. specific
    c. general
    d. concrete

    Answer: c Page: 4

15. In terms of the "Wheel of Science", statistics are central to the research process
    a. only between the theory phase and the hypothesis phase
    b. only between the hypothesis phase and the observation phase
    c. only between the observation phase and the empirical generalization phase
    d. only between the empirical generalization phase and the theory phase

    Answer: c Page: 4

16. As we move down the right-hand side of the “Wheel of Science” we become more
    a. general
    b. abstract
    c. dependent
    d. specific

    Answer: d Page: 4

17. As we move up the left-hand side of the “Wheel of Science” we become more
    a. specific
    b. general
    c. empirical
    d. quantitative

    Answer: b Page: 5

18. In the research process, the role of statistics is limited because
    a. numbers don't prove anything
    b. of possible flaws in research design or method
    c. the researcher may not be a mathematician
    d. people lie when answering questionnaires

    Answer: b Page: 5

19. “Ninety percent of dorm residents approved a proposed ban on smoking”. This statement is an example of the use of
    a. inferential statistics
    b. univariate descriptive statistics

c. multivariate descriptive statistics
d. inductive statistics

Answer: b Page: 7

20. The data reduction process of descriptive statistics
    a. allows a few meaningful numbers to summarize a large amount of data
    b. eliminates incorrect data
    c. simply lists all available information in order
    d. is rarely used

    Answer: a Page: 8

21. If a researcher summarizes the age of 1,000 people by calculating the average age, she is using
    a. a qualitative technique
    b. an incorrect hypothesis
    c. data reduction
    d. non-empirical reasoning

    Answer: c Page: 8

22. If a researcher concludes that "Use of the Internet decreases as social class standing decreases," he is using
    a. univariate descriptive statistics
    b. bivariate descriptive statistics
    c. hypothetical statistics
    d. non-empirical inferential statistics

    Answer: b Page: 8

23. Measures of association are a type of descriptive statistics that allow us to
    a. investigate the causal influence of some variables on others
    b. predict the score on one variable from the score on another
    c. know the strength and direction of a relationship between two or more variables
    d. all of the above

    Answer: d Page: 8

24. A researcher wants to know if there is a relationship between region of birth and political party affiliation. She should calculate a
    a. univariate descriptive statistic like the mean
    b. qualitative measure of influence
    c. measure of association
    d. statistic that measures the non-relational differentiation between the two variables

    Answer: c Page: 8

25. A survey administered to a random sample drawn from a local community finds that a person's political party affiliation is related to whether or not they favor an increase in local sales tax (the headline of a newspaper story based on this poll reads: "Republicans support proposed tax increase"). This is an example of the use of

a. univariate descriptive statistics
b. inferential statistics
c. multivariate descriptive statistics
d. reductionist statistics

Answer: b Page: 9

26. A public opinion poll that gauges the popularity of the President of the United States is an example of
    a. descriptive statistics
    b. inferential statistics
    c. analytical statistics
    d. reductionist statistics

    Answer: b Page: 9

27. Inferential statistics are necessary in social research because
    a. it may be impossible to find all members of a certain population
    b. social scientists don't have the time or money to test an entire population
    c. some of the population might not cooperate
    d. samples are sometimes accurate representations of the population but can't always be used to generalize

    Answer: b Page: 9

28. You ask a sample of 27 students in a particular dorm on campus about their religious beliefs and use this information to make generalizations about all students in the dorm. In this research situation
    a. The 27 students questioned are a population
    b. The dorm is a sample
    c. This is an example of descriptive statistics
    d. The sample is the 27 students who were questioned

    Answer: d Page: 9

29. The poll mentioned in the text suggests that Americans are
    a. Solidly in support of gay marriage
    b. Almost unanimously opposed to gay marriage
    c. Split or polarized on the issue of gay marriage
    d. Indifferent to the issue of gay marriage

    Answer: c Page: 9

30. A nominal-level variable like marital status or gender is always
    a. independent
    b. qualitative
    c. ordinal
    d. dependent

    Answer: a Page: 9

31. Categories of nominal level variables should be
    a. mutually exclusive to avoid ambiguity in classifying cases
    b. exhaustive so that every case fits into a category
    c. relevant to the research goals
    d. all of the above

    Answer: d Page: 11

32. Which of the following is NOT a nominal level variable?
    a. level of education
    b. zip code
    c. occupation
    d. make of automobile

    Answer: a Page: 11

33. Choose the nominal level variable below:
    a. size of family unit
    b. eye color of students in statistics class
    c. speed of travel of a jet plane
    d. your weight

    Answer: b Page: 11

34. In addition to saying that one case is different from another, the ordinal level of measurement allows us to
    a. order categories from high to low
    b. measure the distance between high and low
    c. say that one case is more or less than another
    d. both a and c

    Answer: d Page: 12

35. Variables measured at the ordinal level are limited to which of the following mathematical operations?
    a. addition and subtraction
    b. multiplication
    c. ranking cases as higher or lower, more or less
    d. counting the number of cases per category

    Answer: c Page: 12

36. The variable socioeconomic status ranges from upper class to lower class and is an example of the
    a. nominal level of measurement
    b. ordinal level of measurement
    c. interval-ratio level of measurement
    d. ratio level of measurement

    Answer: b Page: 12

37. Prejudice, when measured on a scale ranging from 'most prejudiced' to 'least prejudiced,' is an example of which level of measurement?
    a. actual
    b. ordinal
    c. nominal
    d. interval-ratio

    Answer: b Page: 12

38. When using interval-ratio data, the distance between the scores is
    a. always two units
    b. unequal
    c. exactly defined
    d. not always clear

    Answer: c Page: 13

39. Which of the following can be treated as an interval-ratio variable?
    a. social security number
    b. zip code
    c. age
    d. hair color

    Answer: c Page: 13

40. The number of years that a couple has been happily married is an example of
    a. nominal level data
    b. ordinal level data
    c. interval-ratio level data
    d. ordinary level data

    Answer: c Page: 13

41. Select the variable(s) that can be measured at the interval-ratio level
    a. different types of crimes
    b. number of children in a family
    c. attractiveness of a person
    d. emotional stability

    Answer: b Page: 13

42. On a test, the numbers used to identify the questions would be _____ in level of measurement while the number of correct responses would be _____.
    a. nominal, interval-ratio
    b. interval-ratio, nominal
    c. interval-ratio, ordinal
    d. ordinal, nominal

    Answer: a Page: 15

43. Computation of a mean (or average) is completely justified when a variable is measured at which level?
    a. interval-ratio
    b. ordinal
    c. nominal
    d. empirical

    Answer: a Page: 15

44. Addition and subtraction are completely justified only when variables are
    a. empirical
    b. inferential
    c. ordinal
    d. interval-ratio

    Answer: d Page: 15

45. Which of the following mathematical operations are permitted with interval-ratio level variables?
    a. addition
    b. subtraction
    c. division
    d. all of the above

    Answer: d Page: 15

46. A researcher has numbered all 50 states from 1 to 50 and has calculated a mean of 17.43 for the variable "state of birth."
    a. Since the variable is nominal, the mean makes no sense
    b. Since the variable is ordinal, we should treat the value of the mean with great caution
    c. The variable is interval-ratio and the mean is an appropriate and useful statistic in this case
    d. Since this variable is non-empirical, the mean should not be computed

    Answer: a Page: 15

47. A researcher has calculated the mean for a variable that is ordinal in level of measurement.
    a. This operation is a violation of level of measurement criterion and the results should be disregarded
    b. This violation of level of measurement criterion is common and results should be treated with caution
    c. No violation has occurred, this is a perfectly acceptable application of statistics
    d. This is a mistake: means should never be calculated for ordinal variables

    Answer: b Page: 15

Essay Questions

1. Summarize the research process as conceptualized in the "Wheel of Science". Identify and explain each of the stages of the research process. At what stage do statistics become central? How? What is the role of statistics in the research process?
   Page: 2-5

2. Below are some items from a survey. For each item, identify the level of measurement and explain your reasoning.

   a. In what region of the country were you born?
      __ South
      __ Northeast
      __ Midwest
      __ Far West
      __ Other
      __ Born out of Country
   b. How many siblings do you have? ___
   c. How satisfied are you with the quality of instruction at this institution?
      __ Very satisfied
      __ Satisfied
      __ Dissatisfied
      __ Very Dissatisfied
   d. How many miles per gallon does your car average?_____
   e. People convicted of first degree murder should be executed.
      __ Strongly Agree
      __ Agree
      __ Neither agree nor disagree
      __ Disagree
      __ Strongly Disagree

Answers to Essay 2:

a. Nominal
   The regions are different but do not form a numerical scale.
b. Interval-ratio
   Number of siblings has a true zero point (no brothers or sisters) and equal Intervals (each brother or sister adds one sibling)
c. Ordinal
d. Interval-ratio
e. Ordinal

Page: 15

3. Some research situations are summarized below. For each situation, identify all variables and characterize them in terms of level of measurement. If applicable, identify which variables are dependent and which are independent. Explain your reasoning. What statistical application is being used?

    a. A group of one hundred students are asked for their High School and college GPAs. The GPAs are then compared to see if there is any relationship between them.
    b. A candidate for student body president telephones a randomly selected sample of students and asks about their opinion of the system used for course evaluation. Each student is asked if they strongly support, moderately support, or do not support the system. The candidate then uses this information to characterize the opinions of the entire student body
    c. From what regions of the nation does a university football program recruit players? A researcher ascertains the hometowns of every member of the team for the past ten years.
    d. Which sport on campus has the players with the highest GPAs? The academic records of randomly selected samples of athletes from all sports are compared to answer this question.
    e. Is academic achievement associated with any "background" variables? Information on a sample of students is collected. The information includes GPA, age, sex, major, years of schooling completed by both parents, and marital status of the student.

Answers to Essay 3

a. The variables are HS and college GPAs (interval-ratio). The application is descriptive and bivariate.
b. The variable is "support for the system of course evaluation" (ordinal). The application is univariate and descriptive and inferential.
c. The variable is region (nominal). The application is univariate descriptive.
d. The variables are sport (nominal) and GPA (interval-ratio). The application is bivariate descriptive. The question implies that sport is independent.
e. The variables are GPA (interval-ratio), age (interval-ratio), sex (nominal), major (nominal), years of schooling of parents (interval-ratio), and marital status (nominal). The application is multivariate descriptive. The background variables would be considered independent and GPA would be dependent.

Page: 15