CHAPTER 2

Basic Descriptive Statistics: Percentages, Ratios and rates, Tables, Charts and Graphs

Chapter Outline

- Percentages and Proportions
- Ratios, Rates, and Percent Change
- Frequency Distributions: Introduction
- Frequency Distributions for Variables Measured at the Nominal and Ordinal Levels

Chapter Outline

- Frequency Distributions for Variables Measured at the Interval-Ratio Level
- Constructing Frequency Distributions for Interval-Ratio Level Variables: A Review
- Charts and Graphs
- Interpreting Statistics: Using Percentages, Frequency Distributions, Charts, and Graphs to Analyze Changing Patterns of Workplace Surveillance

Percentages and Proportions

$$\text{Proportion: } p = \frac{f}{N}$$

$$\text{Percentage: } \% = \left(\frac{f}{N}\right) \times 100$$

where f = frequency, or the number of cases in any category

N = the number of cases in all categories

Percentages and Proportions

- Report ***relative*** size.
- Compare the number of cases in a specific category to the number of cases in *all* categories.
- Compare a *part* (*specific category*) to a *whole* (*all categories*).
  - The *part* is the numerator (*f*).
  - The *whole* is the denominator (*N).*

Percentages and Proportions

- What percentage of a group of people is female?
  - The *whole* is the number of people in the group.
  - The *part* is the number of females.

Percentages and Proportions

- To identify the whole and the part, use the keywords **of** and **is.**
  - **of** identifies the **whole** (N)
  - **is** identifies the **part** (f)

Percentages and Proportions: Example

- What % of social science majors is male?
  - of (whole) = all social science majors
    - 97 + 132 = 229
  - is (part) = male social science majors
    - 97
  - (97/229) * 100 = (.4236) * 100 = 42.36%
  - 42.36% of social science majors are male

Ratios

- Compare the relative sizes of categories.
- Compare ***parts*** to ***parts***.
- Ratio = f_1 / f_2
  - f_1 - number of cases in first category
  - f_2 number of cases in second category

Ratios

- In a class of 23 females and 19 males, the ratio of males to females is:
  - 19/23 = 0.83
  - For every female, there are 0.83 males.
- In the same class, the ratio of females to males is:
  - 23/19 = 1.21
  - For every male, there are 1.21 females.

Rate

- Expresses the number of actual occurrences of an event (births, deaths, homicides) vs. the number of possible occurrences per some unit of time.

Rates

- Birth rate is the number of births divided by the population size times 1000 per year.
- If a town of 2300 had 17 births last year, the birth rate is:
  - (17/2300) * 1000 = (.00739) * 1000 = 7.39
  - The town had 7.39 births for every 1000 residents.

Percentage Change

- Measures the relative increase or decrease in a variable over time.

$$\text{Percentage change} = \left(\frac{f_2 - f_1}{f_1}\right) \times 100$$

where f_1 = first score, frequency, or value

f_2 = second score, frequency, or value

Percentage Change

- f_1 is the first (or earlier) frequency.
- f_2 is the second (or later) frequency.
- Percentage change can also be calculated with percentages, rates, or other values.

Percentage Change: Example

- In 1990, a state had a murder rate of 7.3.
- By 2000, the rate had increased to 10.7.
- What was the relative change?
  - (10.7 – 7.3 / 7.3) * 100 = (3.4 / 7.3) * 100 = 46.58%
- The rate increased by 46.58%.

Frequency Distributions

- Report the number of times each score of a variable occurred.
- The categories of the frequency distribution must be stated in a way that permits each case to be counted in one and only one category.

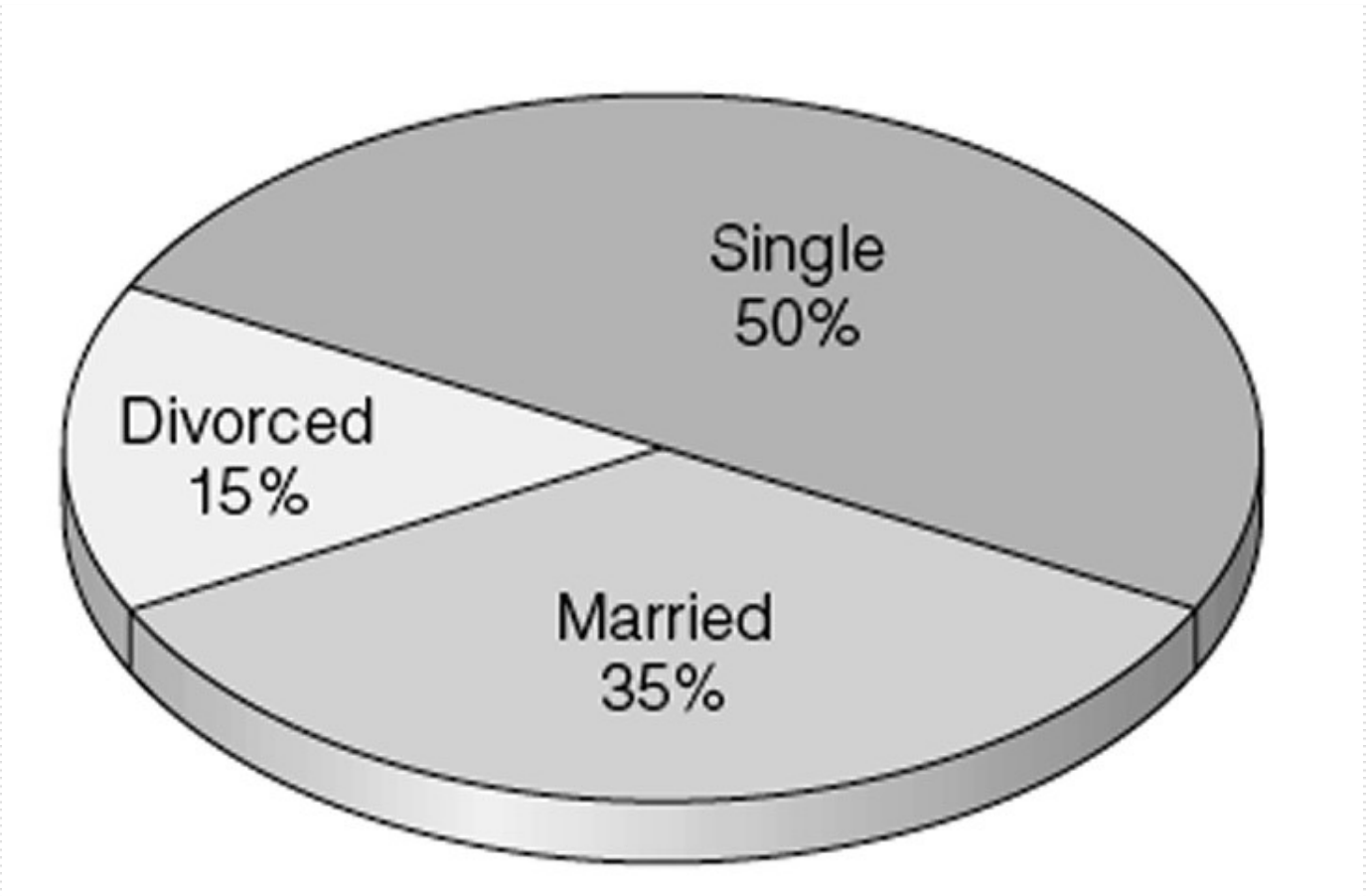
Frequency Distribution Table

Class	Freq.	%
18-19	11	55
20-21	5	25
22-23	2	10
24-25	1	5
26-27	1	5
	20	100

Graphs And Charts

- Pie and bar graphs and line charts present frequency distributions graphically.
- Graphs and charts are commonly used ways of presenting “pictures” of research results.

Sample Pie Chart: Marital Status (N = 20)



Sample Bar Chart: Marital Status Of Respondents (N = 20)



Marriage And Divorce Rates Over Time

How would you describe the patterns?

