

CHAPTER 1

The Nature
of Probability
and Statistics

Outline

- ▣ 1-1 Descriptive and Inferential Statistics
- ▣ 1-2 Variables and Types of Data
- ▣ 1-3 Data Collection and Sampling Techniques
- ▣ 1-4 Observational and Experimental Studies
- ▣ 1-5 Uses and Misuses of Statistics

Statistics

is the science of conducting studies to collect, organize, summarize, analyze, and draw conclusions from data.

1–1 Descriptive and Inferential Statistics

A **variable** is a characteristic or attribute that can assume different values.

Data are the values (measurements or observations) that the variables can assume.

Variables whose values are determined by chance are called **random variables**.

A collection of data values forms a **data set**. Each value in the data set is called a **data value or a datum**.

statistics is divided into two main areas

1. Descriptive statistics
2. Inferential statistics

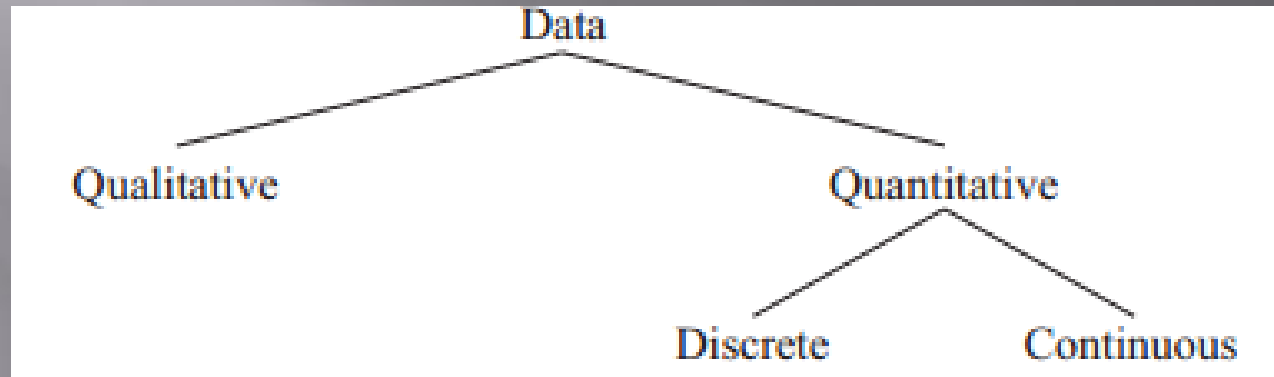
Descriptive statistics

For example: the median household income for people age 25-34 is \$35,888.

Inferential statistics

For example: Allergy therapy makes bees go away.

1–2 Variables and Types of Data



Discrete variables assume values that can be counted.

Continuous variables can assume an infinite number of values between any two specific values. They are obtained by measuring. They often include fractions and decimals.

measurement level for each variable.

The nominal level

For example: Eye colour (blue, brown, green)

The ordinal level

For example: Grade(A, B, C, D, F)

The interval level

For example: IQ, Temperature

The ratio level

For example: Height, weight

1–3 Data Collection and Sampling Techniques

- ▣ **Random Sampling**

For example: Nursing supervisors are selected using random numbers to determine annual salaries.

- ▣ **Systematic Sampling**

For example: Every 100th hamburger manufactured is checked to determine its fat content.

- ▣ **Stratified Sampling**

For example: Mail carriers of a large city are divided into four groups according to gender (male or female) and according to whether they walk or ride on their routes. Then 10 are selected from each group and interviewed to determine whether they have been bitten by a dog in the last year.

- ▣ **Cluster Sampling**

For example: In a large school district, all teachers from two buildings are interviewed to determine whether they believe the students have less homework to do now than in previous years.

1–4 Observational and Experimental Studies

- ▣ In an **observational study**, the researcher merely observes what is happening or what has happened in the past and tries to draw conclusions based on these observations.
- ▣ In an **experimental study**, the researcher manipulates one of the variables and tries to determine how the manipulation influences other variables.

1–5 Uses and Misuses of Statistics

- ▣ Suspect Samples
- ▣ Ambiguous Averages
- ▣ Changing the Subject
- ▣ Detached Statistics
- ▣ Implied Connections
- ▣ Misleading Graphs
- ▣ Faulty Survey Questions