Introduction:

Every field of study has its own terminology. Statistics is no exception. This introductory chapter explains the basic terms and concepts of statistics. These terms and concepts will bridge our understanding of the concepts and techniques presented in subsequent chapter.

Statistics:

The word statistics has two meanings. In the more common usage, statistics refers to numerical facts. The numbers that represent the income of a family, the age of a student, the percentage of passes completed by the quarterback of a football team, and the starting salary of a typical college graduate are examples of statistics in this sense of the word.

The second meaning of statistics refers to the field or discipline of study. In this sense of the word, statistics is defined as follows.

Statistics **Statistics** is the science of collecting, analyzing, presenting, and interpreting data, as well as of making decisions based on such analyses.

Types of Statistics:

Broadly speaking, applied statistics can be divided into two areas: descriptive statistics and inferential statistics.

Descriptive Statistics **Descriptive statistics** consists of methods for organizing, displaying, and describing data by using tables, graphs, and summary measures.

Inferential Statistics **Inferential statistics** consists of methods that use sample results to help make decisions or predictions about a population.

Basic Terms:

Element or Member An **element** or **member** of a sample or population is a specific subject or object (for example, a person, firm, item, state, or country) about which the information is collected.

Table 1.1 Total Wealth of the World's Eight Richest Persons

Name	Total Wealth (billions of dollars)
Bill Gates	79.2
Carlos Slim Helu	77.1
Warren Buffett	72.7
Amancio Ortega	64.5
Larry Ellison	54.3
Charles Koch	42.9
David Koch	42.9
Christy Walton	41.7

Source: *Forbes*, March 23, 2015.

An element or member → Warren Buffett

72.7 ← An observation or measurement

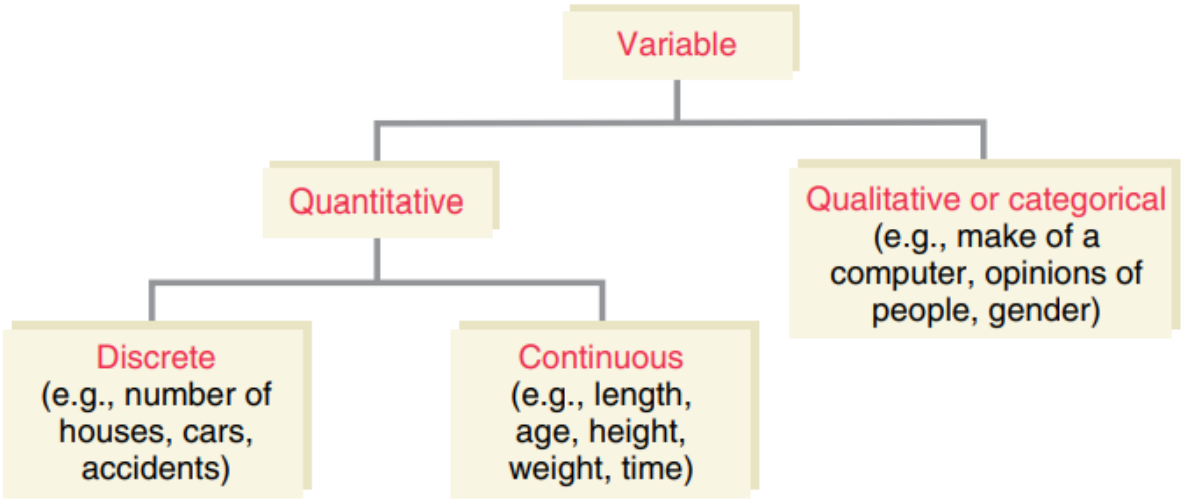
Total Wealth (billions of dollars) ← Variable

Variable A **variable** is a characteristic under study that assumes different values for different elements. In contrast to a variable, the value of a *constant* is fixed.

Observation or Measurement The value of a variable for an element is called an **observation** or **measurement**.

Data Set A **data set** is a collection of observations on one or more variables.

Types of Variables:



Quantitative Variable A variable that can be measured numerically is called a **quantitative variable**. The data collected on a quantitative variable are called **quantitative data**.

Discrete Variable A variable whose values are countable is called a **discrete variable**. In other words, a discrete variable can assume only certain values with no intermediate values.

Continuous Variable A variable that can assume any numerical value over a certain interval or intervals is called a **continuous variable**.

Qualitative or Categorical Variable A variable that cannot assume a numerical value but can be classified into two or more nonnumeric categories is called a **qualitative** or **categorical variable.** The data collected on such a variable are called **qualitative data**.

Population Versus Sample

We will encounter the terms *population* and *sample* on almost every page of this text. Consequently, understanding the meaning of each of these two terms and the difference between them is crucial.

Suppose a statistician is interested in knowing the following:

1. The percentage of all voters in a city who will vote for a particular candidate in an election
2. Last year's gross sales of all companies in New York City
3. The prices of all homes in California

In these examples, the statistician is interested in *all* voters in a city, *all* companies in New York City, and *all* homes in California. Each of these groups is called the **population** for the respective example. In statistics, a population does not necessarily mean a collection of people. It can, in fact, be a collection of people or of any kind of item such as houses, books, television sets, or cars. The population of interest is usually called the **target population**.

Population:

Population or Target Population A **population** consists of all elements—individuals, items, or objects—whose characteristics are being studied. The population that is being studied is also called the **target population**.

Sample:

Sample A portion of the population selected for study is referred to as a **sample**.

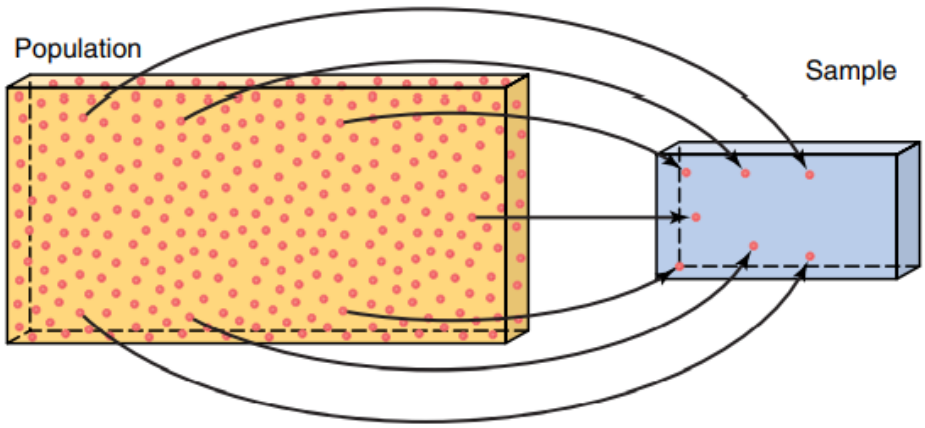


Figure 1.2 Population and sample.