

Some definitions:

- Statistics:

**The study of how to collect, organize, analyze, and interpret numerical information from data.**

- Data:

**Is a collection of numbers, character, images, or other items that provide information about something.**

- Individuals:

**Are the people or object included in the study.**

- Population data

**The data are from every individual of interest.**

- Sample data

**The data are from a subset (some of the individuals) of interest.**

- Parameter

**A numerical measure that describes the **population.** (i.e, Population Age Average)**

- Statistic

**A numerical measure that describes the **sample.** (i.e, Sample Mean)**

- A variable

**Is a characteristic of the individual to be measured or observed. (e.g, Age, Height)**

There are two types of variables; quantitative and qualitative variables.

- Quantitative (Numerical) variables:

**Has numerical measurement, such as Age, Height.**

- Qualitative (Categorical) variables:

**Describes an individual by placing the individual into category or group.  
E.g. Laptop brand (Dell, Asus..)**

*Example 1.* TV station wants to know the proportion of TV owners in California who watch the station's new program at least once a week. The station asks a group of 10,000 TV owners in California if they watch the program at least once a week.

- Identify the individuals of the study and the variable.

**The individuals are the 10,000 TV owners. The variable is the response "does or doesn't" watch the new program at least once a week.**

- Is the variable qualitative or quantitative?

**Qualitative (category)**

<b>Yes does</b>
---------------------

<b>No doesn't</b>
-----------------------

- What is the population and sample?

**Population: The TV owners in CA who watch the station's new program at least once a week.**

**Sample: The group of 10,000 who watch the station's new program at least once a week.**

**Levels Of Measurement: Nominal, Ordinal, Interval, Ratio**

We have categorized data as either qualitative or quantitative. Another way to classify data is according to one of the four levels of measurement. These levels indicate the type of arithmetic that is appropriate for the data, such as ordering, taking differences, or taking ratios.

- The **nominal level of measurement** applies to data that consist of names, labels, or categories. There are no implied criteria by which the data can be ordered from smallest to largest.
- The **ordinal level of measurement** applies to data that can be arranged in order. However, differences between data values either cannot be determined or are meaningless. **We can order the data from smallest to largest or worst to best.**
- The **interval level of measurement** applies to data that can be arranged in order. In addition, differences between data values are meaningful. **[ 2015, 2020 ]**
- The **ratio level of measurement** applies to data that can be arranged in order. In addition, both differences between data values and ratios of data values are meaningful. Data at the ratio level have a true zero. **Age, Annual income, Height**

*Example 2.* The following describe different data associated with a state senator. For each data entry, indicate the corresponding level of measurement.

- The senator's name is XYZ. **Nominal**
- The senator's age is 51 years. **Ratio**
- The years in which the senator was elected to the Senate are 2006, and 2012. **Interval**
- The senator's total taxable income last year was \$478,314. **Ratio**
- The senator's marital status is "married." **Nominal**
- A leading news magazine claims the senator is ranked seventh for his voting record on bills regarding public education. **Ordinal**