

Statistics: Transform data into information.

Biostatistics: When the data is obtained from the biological sciences and medicine.

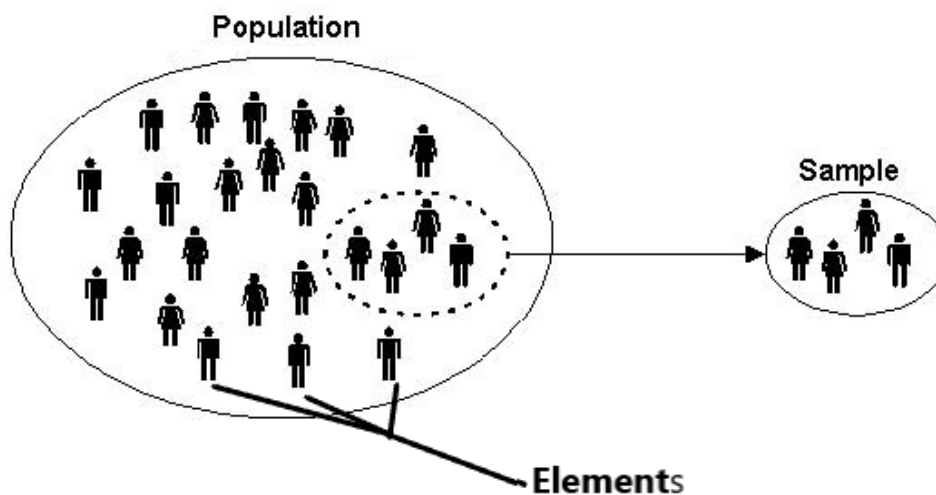
Data: is the raw materials of statistics.

There are two types of data:

1. Quantitative data. (Numbers: weights, ages, height ...).
2. Qualitative data. (Words: color, name, sex, ...).

Statistics divided into two fields:

1. **Descriptive statistics**: which the collecting, organization, summarization and analysis of data.
2. **Inferential statistics**: in which we can drawing inferences and conclusions about a body of data (**population**) when only a part of the data (**sample**) is observed.



Population:

Is the largest collection of elements or individuals about which we want to draw some conclusions.

Example:

If we interested to **study** the **effect** of **new drug** on **diabetic patients**. Then our **population** consists of **all** the diabetic patients in the world and **our variable** of interest is the **diabetes**.

Population Size (N):

Is the number of elements in the population.

Sample: is a part of a population.

Example:

If we randomly select 50 patients have diabetes and give them the new drug and study the drug effect on reducing the level of blood sugar in patients.

Sample Size (n): the number of elements in the sample.

Variables:

The **characteristic** to be measured on the **elements** is called **variables**.

تسمى **الخاصية** المراد قياسها على **العناصر المتغيرات**.

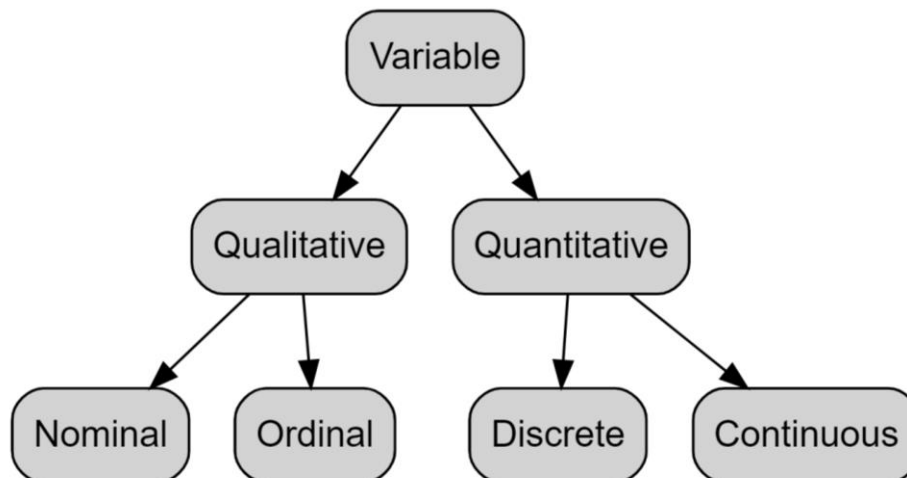
The value of the variable varies from element to element.

تختلف قيمة المتغير من عنصر إلى عنصر.

Example of variables:

- (1) No. of patients
- (2) Height
- (3) Sex

Types of variables:



There are two types of variables:

1. Quantitative variables:

A quantitative variable is a characteristic that can be measured.

المتغير الكمي: هو خاصية يمكن قياسها.

The values of a quantitative variable are numbers indicating how much or how many of something.

قيم المتغير الكمي هي أرقام تشير إلى مقدار أو عدد شيء ما.

Examples:

- (i) Family size
- (ii) No. of patients
- (iii) Weight
- (iv) Height

Types of quantitative variables:

(a) **Discrete variables:**

There are jumps or gaps between the values.

(أ) المتغيرات المنفصلة:

هناك قفزات أو فجوات بين القيم.

Examples:

Family size ($x=1,2,3 \dots$).

No. of patients ($x=0,1,2,3 \dots$).

(b) **Continuous variables:**

There are no gaps between the values.

(ب) المتغيرات المستمرة:

لا توجد فجوات بين القيم.

A continuous variable can have any value within a certain interval of values.

يمكن أن يكون للمتغير المستمر أي قيمة ضمن فاصل معين من القيم.

Examples:

Height ($140 < x < 190$)

Blood sugar level ($10 < x < 15$)

2. Qualitative variables:

The values of a qualitative variable are **words** or attributes indicating to which **category** an element belong.

2 . المتغيرات النوعية:

قيم المتغير النوعي هي كلمات أو سمات تشير إلى الفئة التي ينتمي إليها العنصر.

Examples:

- Blood type
- Gender
- Nationality

Types of qualitative variables:

(a) Nominal qualitative variables:

The values of a nominal variable are names or attribute that can not be ordered or sorted or ranked.

(أ) المتغيرات النوعية الاسمية:

قيم المتغير الاسمي هي أسماء أو سمات لا يمكن تنظيمها أو تصنيفها أو ترتيبها.

Examples:

- Blood type (A, B, AB, O)
- Nationality (Iraqi, Egyptian, British, ...)
- Sex (male, female)

(b) Ordinal qualitative data:

The values of an ordinal variable are categories that can be ordered, sorted, or ranked.

(ب) البيانات النوعية الترتيبية:

قيم المتغير الترتيبي هي فئات يمكن ترتيبها أو فرزها أو ترتيبها.

Examples:

- Severity of pain: (none, mild, moderate, severe).
- Stage of cancer: assign number from (I-IV).
- Patient conditions: (1= Unimproved. 2= stable, 3= improved).