Al-Mustaqbal University
Department Biomedical engineering
Class five
Subject: statistics for biomedical engineer
(Lecturer (Dr.alaa mohammed Hussein wais)
1st term – Lect. (introduction)

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1.1 Introduction Statistics is a collection of scientific methods for collecting, displaying, analyzing, and drawing conclusions from data.

1.2 types of statistical methods.

Two types of statistical methods are used **in analyzing data**:
1- descriptive statistics.
2- inferential statistics.

- **Descriptive statistics** are used to organizing and summarizing data using numbers and graphs.

descriptive statistics you are simply describing what the data shows, **for example figure 1 show that Ph increase as the concentration increase.**
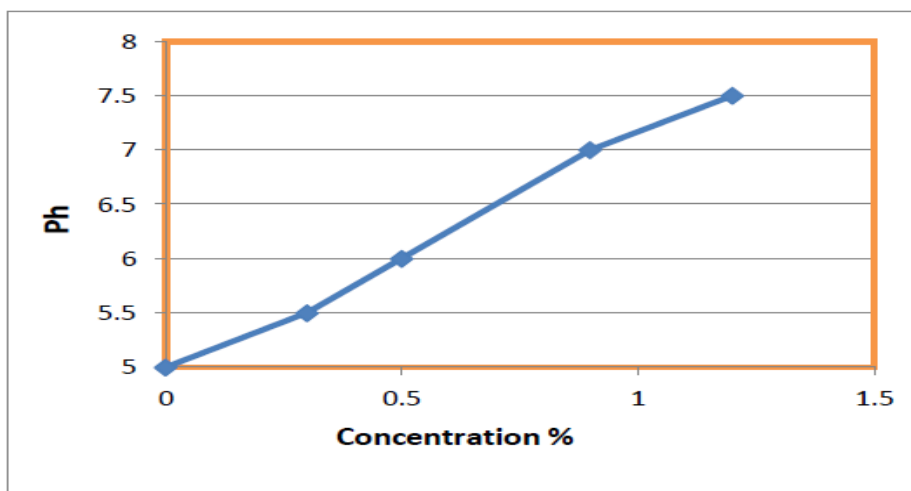

Fig. 1: **Descriptive statistics**

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• **Inferential statistics** used to make inferences using a sample data taken from a population or draw a conclusion of the population. Inferential statistics takes data from a random sample and makes conclusion about the larger population.
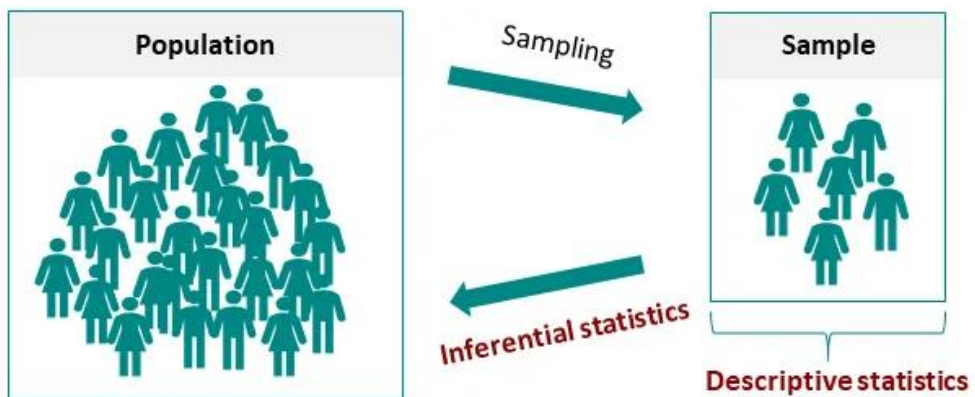

1.3 The advantages of Statistics.

1. *Making sense of data.*

2. *Identifying patterns and trends*

3. *Making predictions*

4. *Making decisions*

5. *Communicating information*

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1.4 Basic concepts of statistics.

Common concepts include population, sample, measures of Central tendency, variance, and standard deviation, and ANOVA.

Basic Statistics Concepts
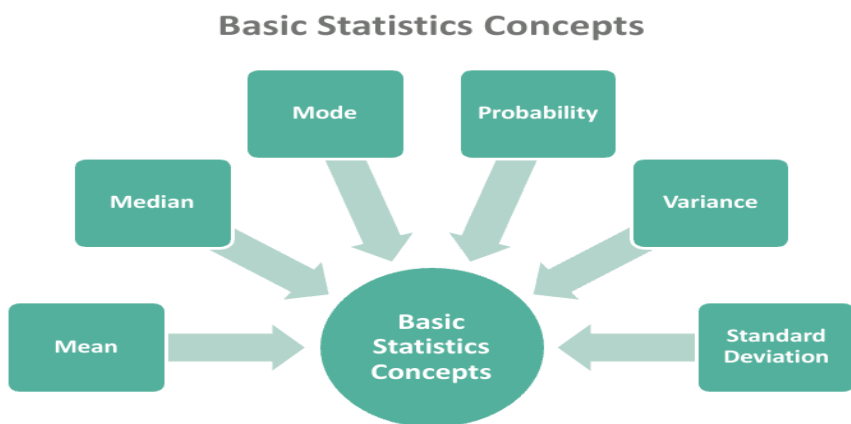
Population refers to the members of the group that a study takes.

Sample is a part of the population taken for analysis, while the parameter is the numerical measure that describes the characteristics of a population set.

Measures of Central Tendency, The three indicators of central tendency are the mean, median, and mode. One can determine the central value of the given set of data

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(grouped and ungrouped) using the three measures of central tendency.
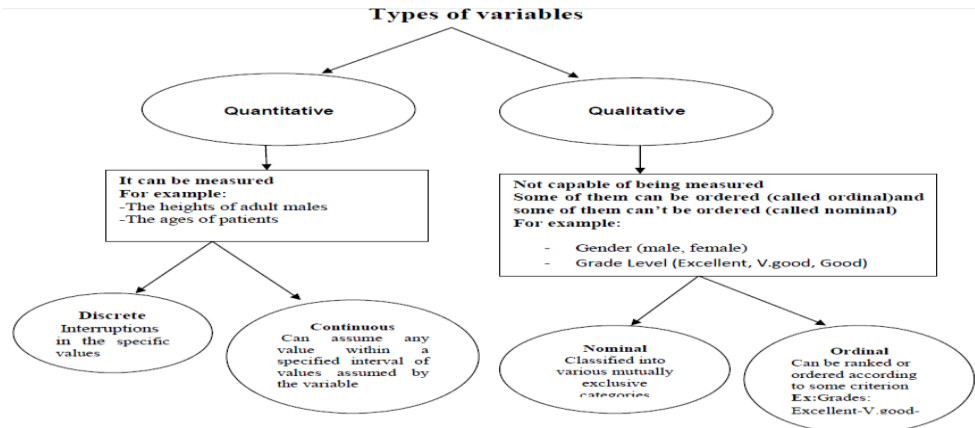
Variance, And Standard Deviation, one can utilize the concept of variance as an intermediary for the standard deviation computation. The standard deviation is termed the square root of variance. A standard deviation measures how much data deviates from the mean. The standard deviation is low if the data falls into a range reasonably close to the mean.

ANOVA Statistics, Analysis of Variance, or ANOVA, is a term that refers to a group of statistical models that are employed to calculate the difference in mean for the specified set of data.

Computer in Statistics:

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1.5 Display of Data.

Types of variables

Quantitative

It can be measured
For example:
-The heights of adult males
-The ages of patients

Discrete
Interruptions in the specific values

Continuous
Can assume any value within a specified interval of values assumed by the variable

Qualitative

Not capable of being measured
Some of them can be ordered (called ordinal)and some of them can't be ordered (called nominal)
For example:
- Gender (male, female)
- Grade Level (Excellent, V.good, Good)

Nominal
Classified into various mutually exclusive categories

Ordinal
Can be ranked or ordered according to some criterion
Ex:Grades:
Excellent-V.good-

1.6 Sources of Data

Any statistical data can be classified under two categories depending upon the **sources utilized**. These categories are,

1. Primary data
2. Secondary data

1- Primary data:

Primary data are information collected by a researcher specifically for a research assignment. Such data is original is generated by survey conducted by individuals.

The primary data can be collected by the following four methods:

1. Direct personal interviews.
2. Indirect Oral interviews.
3. Information from correspondents.
4. Questionnaire method.

2- Secondary Data:

Secondary data are those data which have been already collected for some other purpose and at different time in the past.