SAWA UNIVERSITY

الاحصاء - SPSS

المحاضرة الخامسة

جامعـــــــة ســـــــــاوة

الاهلية

كليـــــة التقنيـــات الصحيـة

والطبيـة

قسم تقنيات المختبرات

الطبية

المرحلـــــــــــــة الثانية.

Sawa University

College of health and medical techniques

Department of Medical Laboratories

. 2nd Stage

تدريسي المادة : م.م سلام النجيب

محاضرة رقم ٥

Lecture No. 5

الجانب النظري

Theoretical

Measures of central tendency (location)

The tendency of statistical data to get concentrated at certain values is called the "**Central Tendency**" and the various methods of determining the actual value at which the data tend to concentrate are called **measures of central Tendency or averages**.

Measures of central tendency (location)

1. The Arithmetic Mean or simple Mean

One measure of central tendency is the **arithmetic mean** ; it is usually denoted by $\bar{X}$.

Definition: The arithmetic mean is the sum of all observations divided by the number of observations.

It is written in statistical terms as:

$$\bar{X} = \frac{1}{2}\sum x_i \quad i = 1,2,3,\ldots\ldots n$$

Measures of central tendency (location)

2. Median

An alternative measure of central location, perhaps second in popularity to the arithmetic mean, is the median.

It is the middle value when the given figures (numbers) are arranged in increasing or decreasing order.

$$medain = (\frac{n+1}{2})^{th} \; for \; n \; is \; odd$$

$$medain = (\frac{n}{2})^{th} \; and (\frac{n}{2}+1)^{th} \; for \; n \; is \; even$$

Measures of central tendency (location)

3. Mode (Modal)

It is the value of the observation that occurs with the greatest frequency.

A particular disadvantage is that, with a small number of observations, there may be **no mode**.

In addition, sometimes, there may be more than one mode

3, 4, 2, 5 no modal value

3, 4, 2,5,4 modal value is 4

Measures of Dispersion

1. Range

The range is defined as the difference between the highest and smallest observation in the data.

It is the crudest measure of dispersion. The range is a measure of absolute dispersion and as such cannot be usefully employed for comparing the variability of two distributions expressed in different units.

$$Range = X_{max} - X_{min}$$

Measures of Dispersion

2. Variance

The variance is a summary figure which measures the average variability from the arithmetic mean. It is a very useful measure of variability because it uses the information provided by every observation in the sample and also it is very easy to handle mathematically.

$$S^2 = \frac{\sum(X_i - \bar{X})^2}{n-1}$$

Measures of Dispersion

3. Standard Deviation

Definition: The square root of the variance is called the standard deviation.

The sample and population standard deviations denoted by S and σ (by convention) respectively are defined as follows:

$$S = \sqrt{\frac{\sum(X_i - \bar{X})^2}{n-1}}$$

$$\sigma = \sqrt{\frac{\sum(X_i - \bar{X})^2}{N}}$$

Measures of Dispersion

4. The coefficient of variation

The coefficient of variation (CV) is a statistical measure of the relative variability of a dataset. It is defined as the ratio of the standard deviation (σ) to the mean (μ) and is often expressed as a percentage:

$$CV = \frac{S}{\bar{X}} * 100\%$$