1 MEASURES OF CENTRAL TENDENCY

These measures are also called as statistical averages or averages. A measure of central tendency is a value around which all the observations have a tendency to cluster. Such a value is considered as the most representative figure of the entire data-set. Three most popular and important measures of central tendency are mean, median, and mode.

1.1 Mean

It is the most common measure of central tendency and may be defined as the value which we get by dividing the total of the values of various given items in a series by the total number of items. we can work it out as under:

$$\text{Mean (or } \bar{X}\text{)} = \frac{\sum X_i}{n} = \frac{X_1 + X_2 + \ldots + X_n}{n}$$

where, $\bar{X}$ = The symbol we use for mean (pronounced as X bar)

Σ = Symbol for summation

X_i = Value of the ith item X, $i = 1, 2, \ldots, n$

n = Total number of items

In case of frequency distribution when the whole data set of size n is summarized in k class intervals, mean is calculated as

$$\bar{X} = \frac{\sum_{i=1}^{k} f_i X_i}{\sum_{i=1}^{k} f_i} = \frac{f_1 X_1 + f_2 X_2 + \ldots + f_k X_k}{f_1 + f_2 + \ldots + f_k}$$

where, X_i = Mid-point of ith class interval and $f_1 + f_2 + \ldots + f_k = n$.

Sometimes, instead of calculating the simple mean, as stated above, we may workout the weig mean for a realistic average. The weighted mean can be worked out as follows:

$$\bar{X}_w = \frac{\sum w_i X_i}{\sum w_i}$$

where, $\bar{X}_w$ = Weighted item

w_i = Weight of ith item X, assigned by the researcher using the some prior knowledg

X_i = Value of the ith item X

Mean is the simplest and most widely used measure of central tendency. People use mea daily life so much that it has become a synonym of average. For example, Ravi consumes 4 cigare on an average daily; Suresh drinks approximately 2 litres of water, on an average daily. However, mean suffers from some limitations. When the data-set has one or more extreme values, the magni of mean is affected and it provides a wrong impression of the other values in the data-set, when to represent the whole data-set.

8.1.2 Median

When the data-set has outliers, mean becomes flowed as a representative of the data-set. In su case, median is used as a measure of central tendency. Median divides the data-set into two e parts. Half of the items are less than the median and remaining half of the items are larger tha median. In order to obtain the median, we first arrange the data-set into ascending or descen order. If number of observations in the data set is n, then the

$$\text{Median} = \left(\frac{n+1}{2}\right)\text{th observation, when } n \text{ is odd;}$$

$$= \frac{1}{2}\left[\left(\frac{n}{2}\right)\text{th observation} + \left(\frac{n}{2}+1\right)\text{th observation}\right], \text{ when } n \text{ is e}$$

For example, median of the data-set 2, 5, 6, 11, 59 is 6, while median of the data-set 5, 6, 1 is $\frac{1}{2}[6+11]$ or 8.5.

Median is a positional average and is used only in the context of qualitative phenomen example, in estimating intelligence, etc., which are often encountered in sociological fields. Med not useful where items need to be assigned relative importance and weights. It is not frequently in sampling statistics.

1.3 Mode

e most frequently occuring observation in the data-set is mode. Mode is a french word having the eaning fashion. It is particularly useful in the study of popular sizes. For example, a manufacturer f shoes is usually interested in finding out the size most in demand so that he may manufacture a ger quantity of that size. Like median, mode is also a positional average and is not affected by treme values. Mode is not amenable to algebraic treatment. A data-set may not have any mode or ere may be more than one modes in a data-set.