Statistics: Definition, Importance, Limitation

Meaning of Statistics

Statistics is a form of mathematical analysis that uses quantitative models, representations, and excerpts for a specific set of empirical data or factual studies. Statistics study methodologies for collecting, reviewing, analyzing and extracting results from data. Some statistical measures include mean, variance, regression analysis, deviation, variance analysis.

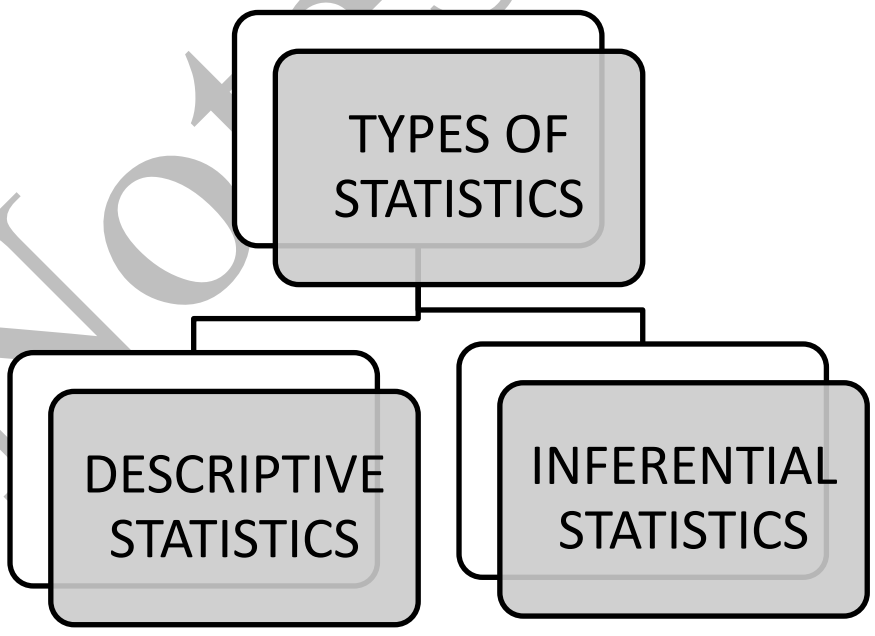
Statistics is a term used to summarize the process that an analyst uses to describe a data set. If the dataset is based on a sample of a larger population, the analyst can develop population explanations based primarily on statistical results from the sample. Statistical analysis involves collecting and evaluating data, and then summarizing the data in mathematical form.
Statistical methods analyze large amounts of data and properties. Statistics are used in various disciplines such as psychology, business, physical and social sciences, humanities, government, and manufacturing. Statistical data is collected using a sample procedure or another method. Two types of statistical methods used in data analysis are descriptive statistics and inferential statistics. Descriptive statistics are used to collect data from a sample that practices an average standard deviation. Inferential statistics are used when looking at data as a subcategory of a specific population.

Definition of Statistics

- According to Seligman," it is a science which deals with the method of collecting, classifying, presenting, comparing and interpreting the numerical data to throw light on enquiry."
- According to professor Boddingtons," It is the science of estimates and probabilities."
- According to Croxton and Cowden," It is the science of collection, presentation, analysis and interpretation of numerical data from logical analysis."

Types of Statistics

1. **Descriptive statistics -** Descriptive statistics are one of the basic "must know" with any set of data. It gives you a general idea of the trends in your data including average, position, median, range, variance and standard deviation, deviation, number, maximum and minimum. Descriptive statistics are useful because they allow you to take a large amount of data and summarize it. For example, suppose you have data on one million people entering. No one would want to read a million pieces of data; if they did, they wouldn't be able to collect any useful information from it. On the other hand, if you summarize it, it becomes useful: average wage, or average income, much easier to understand than a data packet.
2. **Inferential statistics -** Inferential statistics allow you to make predictions from that data. Using inferential statistics, you can take data from samples and make generalizations about the community. For example, you can park in a mall and ask a sample of 100 people if they love shopping in that mall. You can do a bar chart with yes or no answers (may be descriptive statistics) or you can use your search (and inferential statistics) for the reasons that around 75-80% of the population (all shoppers in all malls) like shopping in later.



Characteristics of statistics-

1. It consists of groups of facts:

In the sense of plural, statistics refer to data, but data called statistics must consist of a set of certain facts.

A single isolated fact or personality, such as 60 kg. The student's weight or the death of a specific person in one day does not rise to the stats.

For data that may reach statistics, it must be in the form of a set or a set of specific facts, meaning. 50, 65, 70 kg. Students weigh in a semester or company earnings at different times, etc. is vulnerable to multiple causes.

2. Affected by many reasons:

It is not easy to study the effects of one factor only by ignoring the effects of other factors. Here we have to go to the effects of all factors on the phenomenon separately as well as collectively, because the effects of the factors can change with the change of place, time or situation.

Here, the general effect is taken and not just one factor as in other natural sciences. For example, we can say that the result of the twelfth semester in the Board of Directors exam does not depend on any single factor but collectively at the level of teachers, teaching methods, teaching methods, students 'practical performance, the level of question papers as well as evaluation.

3. Must be expressed numerically:

The data that is called must be statistically digitalized in order to calculate or measure the data. This means that the data or the fact that statistics are generated must be expressed in quantitative terms as weights 60, 70, 100 and 90 kg. Or rupee profits. 10,000 rupees. 20000 etc. Therefore, this data must contain numeric numbers in order to be labeled as numerical data of facts.

4. It must be carefully enumerated or estimated:

As mentioned above, the data should be accurate and meaningful. To obtain a reasonable level of accuracy, the inquiry field must not be very large. If it is infinite or very large, even data enumeration is impossible and a reasonable standard of accuracy may not be met. To achieve this, we have to make an estimate in accordance with the reasonable accuracy standard depending on the nature and purpose of the data collection. For example, we can measure the height of buildings in meters, but we cannot measure the length of small things like bricks in the same unit of measurement.

5. They must be collected in a systematic way:

Another feature of statistics is that data must be collected in a systematic way. Randomly collected data will lead to difficulties in the analysis process and wrong conclusions. An appropriate plan should be developed and trained investigators use to collect data so that they can collect statistics. If not, in these cases the reliability of the data will decrease. To get the correct results, data must be collected in an accurate manner.

6. It must be collected for a predetermined purpose:

Before we start collecting data, we must be clear about the purpose for which we collect data. If we do not have information about its purpose, we may not collect data according to needs. We may need some more relevant data to achieve the desired purpose, which, if ignorant, we may miss.

Suppose we want to obtain data on imports and exports, we need to know about various sectors such as electronics, consumer articles, grains and other seasons. The duty is to calculate the vehicles that pass through a road at the time of the unit is statistics, but the same work done by anyone else who has nothing to do with this field, not statistics because the first is doing this for the government that wants to make it four lanes - if necessary.

Scope of Statistics

The fact that statistical methods in the modern world are universally applicable. It is enough in itself to show how important statistics are. In fact, there are millions of people around the world who haven't heard a word about statistics yet still use statistical methods a lot in their daily decisions. Statistical methods are common thinking methods, and therefore they are used by all types of people.

Let us now discuss briefly the importance of statistics in some different disciplines:

(i) Statistics in Planning:

Statistics is indispensable in planning—may it be in business, economics or government level. The modern age is termed as the ‘age of planning’ and almost all organizations in the government or business or management are resorting to planning for efficient working and for formulating policy decision.

To achieve this end, the statistical data relating to production, consumption, birth, death, investment, income are of paramount importance. Today efficient planning is a must for almost all countries, particularly the developing economies for their economic development.

(ii) Statistics in Mathematics:

Statistics is intimately related to and essentially dependent upon mathematics. The modern theory of Statistics has its foundations on the theory of probability which in turn is a particular branch of more advanced mathematical theory of Measures and Integration. Ever increasing role of mathematics into statistics has led to the development of a new branch of statistics called Mathematical Statistics.

Thus Statistics may be considered to be an important member of the mathematics family. In the words of Connor, "Statistics is a branch of applied mathematics which specializes in data."

(iii) Statistics in Economics:

Statistics and Economics are so intermixed with each other that it looks foolishness to separate them. Development of modern statistical methods has led to an extensive use of statistics in Economics.

All the important branches of Economics—consumption, production, exchange, distribution, public finance—use statistics for the purpose of comparison, presentation, interpretation, etc. Problem of spending of income on and by different sections of the people, production of national wealth, adjustment of demand and supply, effect of economic policies on the economy etc. simply indicate the importance of statistics in the field of economics and in its different branches. Statistics of Public Finance enables us to impose tax, to provide subsidy, to spend on various heads, amount of money to be borrowed or lent etc. So we cannot think of Statistics without Economics or Economics without Statistics.

(iv) Statistics in Social Sciences:

Every social phenomenon is affected to a marked extent by a multiplicity of factors which bring out the variation in observations from time to time, place to place and object to object. Statistical tools of Regression and Correlation Analysis can be used to study and isolate the effect of each of these factors on the given observation.

Sampling Techniques and Estimation Theory are very powerful and indispensable tools for conducting any social survey, pertaining to any strata of society and then analyzing the results and drawing valid inferences. The most important application of statistics in sociology is in the

field of Demography for studying mortality (death rates), fertility (birth rates), marriages, and population growth and so on.

In this context Croxton and Cowden have rightly remarked:

"Without an adequate understanding of the statistical methods, the investigators in the social sciences may be like the blind man groping in a dark room for a black cat that is not there. The methods of statistics are useful in an over-widening range of human activities in any field of thought in which numerical data may be had."

(v) Statistics in Trade:

As already mentioned, statistics is a body of methods to make wise decisions in the face of uncertainties. Business is full of uncertainties and risks. We have to forecast at every step. Speculation is just gaining or losing by way of forecasting. Can we forecast without taking view the past? Perhaps, no. The future trend of the market can only be expected if we make use of statistics. Failure in anticipation will mean failure of business.

Changes in demand, supply, habits, fashion etc. can be anticipated with the help of statistics. Statistics is of utmost significance in determining prices of the various products, determining the phases of boom and depression etc. Use of statistics helps in smooth running of the business, in reducing the uncertainties and thus contributes towards the success of business.

(vi) Statistics in Research Work:

The job of a research worker is to present the result of his research before the community. The effect of a variable on a particular problem, under differing conditions, can be known by the research worker only if he makes use of statistical methods. Statistics are everywhere basic to research activities. To keep alive his research interests and research activities, the researcher is required to lean upon his knowledge and skills in statistical methods.

Advantages of statistics

1. They permit the most exact kind of description:

The goal of science is description of phenomena. The description should be complete and accurate so that it can be useful to anyone who can understand it when he reads the symbols. Mathematics and statistics are a part of the descriptive language, an outgrowth of our verbal symbols.

2. They force us to be definite:

Statistics makes the activities of a researcher definite and exact—both in his procedures and thinking. Statistics systematizes the efforts of a researcher and leads him towards the goal.

3. They help us to summarize the results:

Masses of observations taken by them are bewildering and almost meaningless. Statistics enables us to summarize our results in meaningful and convenient form. Before we can see the forest as well as the trees, order must be given to the data. Statistics provides an unrivalled device for bringing order out of chaos, of seeing the general picture in one's results.

4. They enable us to draw general conclusions:

And the process of extracting conclusions is carried out according to accepted rules. Furthermore, by means of statistical steps, we can say about how much faith should be placed in any conclusion and about how far we may extend our generalization.

5. They enable us to make predictions:

of "how much" of a thing will happen under conditions we know and have measured. For example, we can predict the probable mark a freshman will earn in college algebra if we know his score in a general academic aptitude test, his score in a special algebra-aptitude test, his average mark in high-school mathematics, etc. Our prediction may be somewhat in error, but statistical method will tell us about how much margin of error to allow in making predictions.

Limitations of Statistics

The important limitations of statistics are:

(1) Statistics laws are true on average. Statistics are aggregates of facts, so a single observation is not a statistic. Statistics deal with groups and aggregates only.

(2) Statistical methods are best applicable to quantitative data.

(3) Statistics cannot be applied to heterogeneous data.

(4) If sufficient care is not exercised in collecting, analyzing and interpreting the data, statistical results might be misleading.

(5) Only a person who has an expert knowledge of statistics can handle statistical data efficiently.

(6) Some errors are possible in statistical decisions. In particular, inferential statistics involves certain errors. We do not know whether an error has been committed or not.