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INTRODUCTION

Statistics is a branch that deals with every aspect of the data. Statistical knowledge helps to choose the proper method of collecting the data and employ those samples in the correct analysis process in order to effectively produce the results. In short, statistics is a crucial process which helps to make the decision based on the data.

Statistics is an important field because it helps us understand the general trends and patterns in a given data set. Statistics can be used for analyzing data and drawing conclusions from it. It can also be used for making predictions about future events and behaviors.

MEANING

“Statistics‟ means numerical presentation of facts. Its meaning is divided into two forms - in plural form and in singular form. In plural form, “Statistics‟ means a collection of numerical facts or data. example:- price statistics, agricultural statistics, production statistics, etc. In singular form, the word means the statistical methods with the help of which collection, analysis and interpretation of data are accomplished.

Statistics in Maths

In Mathematics, statistics concerns the collection of data, organization, interpretation, analysis and data presentation. The main purpose of using statistics is to plan the collected data in terms of experimental designs and statistical surveys. Statistics is considered a mathematical science that works with numerical data. In short, statistics is a crucial process which helps to make the decision based on the data.

DATA

Data refers to any group of measurements that happen to interest us. These measurements provide information the decision maker uses. Data is the foundation of any statistical investigation and the job of collecting data is the same for a statistician as collecting stone,

mortar, cement, bricks etc. is for a builder.

Statistics Example

An example of statistical analysis is when we have to determine the number of people in a town who watch TV out of the total population in the town. The small group of people is called the sample here, which is taken from the population.

CHARACTERISTICS OF STATISTICS

a) Aggregate of facts/data
b) Numerically expressed
c) Affected by different factors
d) Collected or estimated
e) Reasonable standard of accuracy
f) Predetermined purpose
g) Comparable
h) Systematic collection.

It consists of aggregates of facts:

In the plural sense, statistics refers to data, but data to be called statistics must consist of aggregate of certain facts.

A single and isolated fact or figure like, 60 Kgs. The weight of a student or the death of a particular person on a day does not amount to statistics.

For a data may amount to statistics it must be in the form of a set or aggregate of certain facts, viz. 50, 65, 70 Kgs. Weight of students in a class or profits of a firm over different times etc. is liable to be affected by multiplicity of causes.

Therefore, the process of collecting, classifying, presenting, analyzing and interpreting the numerical facts, comparable for some predetermined purpose are collectively known as “Statistics”

It should be numerically expressed:

A data to be called statistics should be numerically expressed so that counting or measurement of data can be made possible. It means that the data or the fact to constitute statistics must be capable of being expressed in some quantitative form as weights of 60, 70, 100 and 90 Kg. or profits of Rs. 10,000, Rs. 20,000 etc. Thus these data must contain numerical figures so that those may be called as numerical

statements of facts.

It is affected by different factors /many causes:

It is not easy to study the effects of one factor only by ignoring the effects of other factors. Here we have to go for the effects of all the factors on the phenomenon separately as well as collectively, because effects of the factors can change with change of place, time or situation.Here, the overall effect is taken and not of one factor only as in other natural sciences. For example, we can say that the result of class XII in board examination does not depend on any single factor but collectively on the standard of teachers, teaching methods, teaching aids, practical performance of students, standard of question papers and as well as of evaluation.

It should be collected in a systematic manner:

Another characteristic of statistics is that the data should be collected in a systematic manner. The data collected in a haphazard manner will lead to difficulties in the process of analysis, and wrong conclusions. A proper plan should be made and trained investigators should be used to collect data so that they may collect statistics. If it is not done, in such cases reliability of data gets decreased. So to get correct results the data must be collected in a precise manner.

It must be enumerated or estimated accurately:

As stated above, the statements should be precise and meaningful. For getting a reasonable standard of accuracy the field of enquiry should not be very large. If it is infinite or very large, even enumeration of data is impossible and a reasonable standard of accuracy may not be achieved. To achieve it we have to make on estimate according to reasonable standard of accuracy depending upon the nature and purpose of collection of data. e.g. we may measure the height of buildings in meters but we cannot measure the length of small things like bricks in the same unit of meter.

It should be collected for a predetermined purpose:

Before we start the collection of data, we must be clear with the purpose for which we are collecting the data. If we have no information about its purpose, we may not be collecting data according to the needs. We may need some more relevant data to achieve the required purpose, which we would miss in the event of its ignorance.

Suppose we want to get data on imports and exports, we have to know about various segments such as electronics, consumer articles, grains and such other segregations also. If some person in the government. duty is counting the vehicles passing through a road in a unit time is statistics, but same work done by any other person not related to this field, is not statistics because the former is doing it for the Government which wants

to make it a four lane road-if needed.

It should be capable of being placed in relation to each other:

Last but not least, the characteristics of the statistics. The collection of data is generally done with the motive to compare. If the figures collected are not comparable, in that case, they lose a large part of their significance.

It means,the figure collected should be homogeneous for comparison and not heterogeneous. For example, Heterogeneous data like the sale of Rs. 20,000 result of 80% cases and mileage of 80 kms can never be placed in relation to each other and compared for analysis and interpretation which is the ulterior motive of the science of statistics. It can be concluded that all statistics are numerical data but all numerical data are not statistics unless they satisfy all the essential characteristics of statistics, depicted as above.

Importance of Statistics

The important functions of statistics are:

- **Reduces complexities:** Using statistical methods, voluminous data can be presented in a way that it can be easily understood. Hence, it reduces the complexity to understand a vast amount of data, to simplify its meaning.
- **Expresses facts in numbers:** An important function of statistics is that it can transform facts into numbers, which is easy to understand by anyone.
- **Presentation of data in condensed form:** Data collected is usually in raw form, which is complex and unorganized. Hence, it requires to be presented in a simple form so as to reach a final conclusion. With the help of statistics, a large amount of data can be presented in condensed form.
- **Increases the individual knowledge and experience:** As the presentation of data is simple, it enhances the knowledge and experience of people, by making it simple and easy to understand, without having knowledge of each and every field.
- **Different phenomena are compared:** Statistics helps in making a comparison of data and measuring the relationship between them. For example: Suppose a

researcher wants to measure the level of production of soybeans in two states, then he/she would use statistics.

- **Helpful in the formulation of policies:** Plans and policies are developed beforehand in an organization. And statistics plays a very crucial role in determining the future trends, so as to frame them, by providing the required information.
- **Helpful in prediction and forecasting:** The knowledge of statistics is not just helpful in estimating the present but it also helps in forecasting the future.
- Statistics helps in gathering information about the appropriate quantitative data.
- It depicts the complex data in graphical form, tabular form and in diagrammatic representation to understand it easily.
- It provides the exact description and a better understanding.
- It helps in designing the effective and proper planning of the statistical inquiry in any field.
- It gives valid inferences with the reliability measures about the population parameters from the sample data.
- It helps to understand the variability pattern through the quantitative observations.

utility of Statistics

The use of statistics has become almost essential in order to clearly understand and solve a problem. Statistics proves to be much useful in **unfamiliar fields of application and complex situations** such as :-

a) Planning

b) Administration

c) Economics

d) Trade & Commerce

e) Production management

f) Quality control

g) Helpful in inspection

h) Insurance business

i) Railways & transport Co

a) Banking Institutions

b) Speculation and Gambling

c) Underwriters and Investors

d) Politicians & social workers.

SCOPE OF STATISTICS

The scope of statistics is very extensive. It can be divided into two parts –

(i) **Statistical Methods** such as Collection, Classification, Tabulation, Presentation, Analysis, Interpretation and Forecasting.

(ii) **Applied Statistics –** It is further divided into three parts:-

a) **Descriptive Applied Statistics :** Purpose of this analysis is to provide descriptive information.

b) **Scientific Applied Statistics :** Data are collected with the purpose of some scientific research and with the help of these data some particular theory or principle is propounded.

c) **Business Applied Statistics :** Under this branch statistical methods are used for the study, analysis and solution of various problems in the field of business.

LIMITATION OF STATISTICS

Scope of statistics is very wide. In any area where problems can be expressed in qualitative form, statistical methods can be used. But statistics have some limitations

1. Statistics can study only numerical or quantitative aspects of a problem.

2. Statistics deals with aggregates not with individuals.

3. Statistical results are true only on an average.

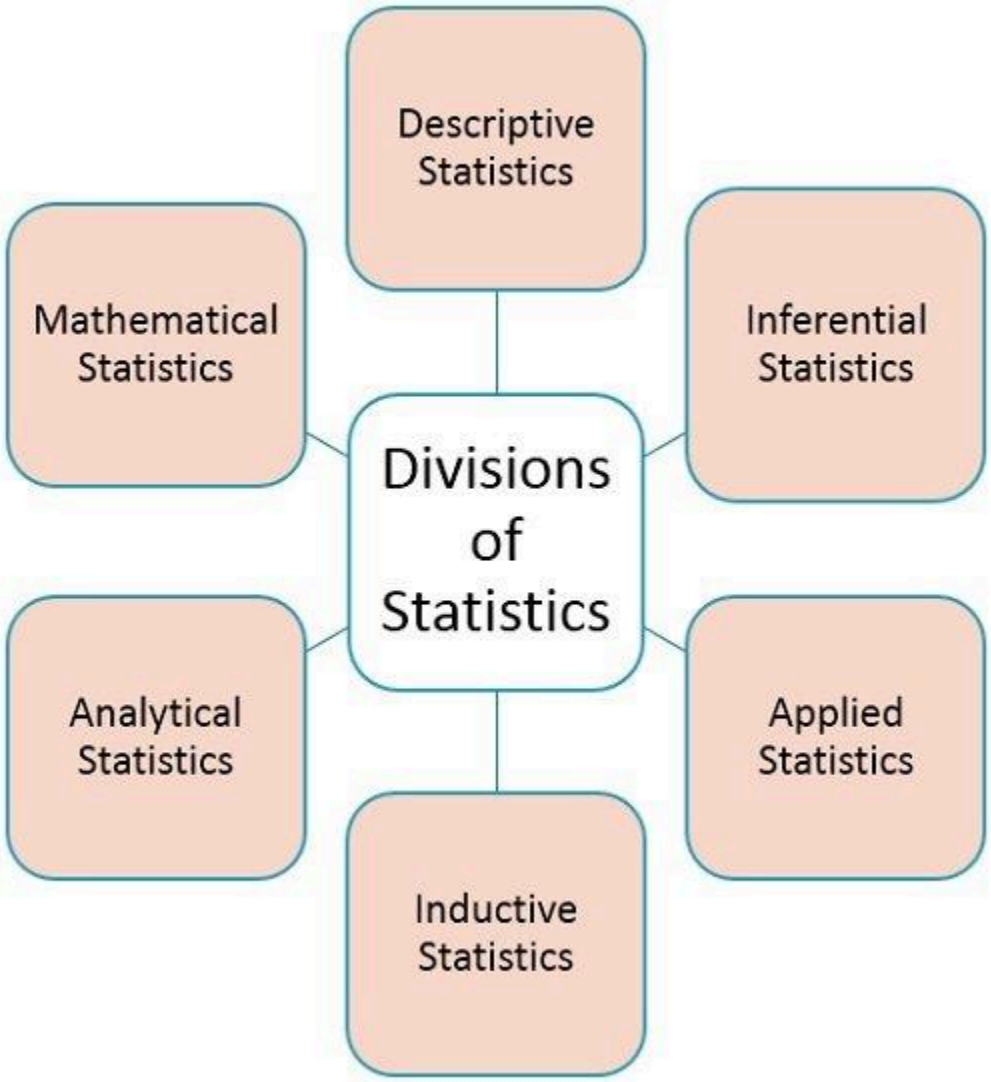
4. Statistical laws are not exact.

5. Statistics do not reveal the entire story.

6. Statistical relations do not necessarily bring out the cause and effect relationship between phenomena.
7. Statistics are collected with a given purpose.
8. Statistics can be used only by experts.

Divisions of Statistics

The different types or branches of statistics are discussed hereunder:



1. **Descriptive Statistics:** It involves describing and summarizing the sets of numerical data with the help of pictures and statistical quantities. Techniques used may include averages dispersion, skewness, time series, etc.
2. **Inferential Statistics:** It encompasses those methods that are helpful in drawing conclusions and inferences with respect to parameters of population, based on estimates which are drawn from samples. Chi-square, F-test, t-test, etc techniques are used.
3. **Applied Statistics:** Those methods and techniques are used in applied statistics which are applicable to specific problems of real-life scenarios. Techniques used may include sample survey, quality control, index numbers etc.
4. **Inductive Statistics:** Those methods and techniques are covered here which are used to identify a specific phenomenon based on random observation. Techniques used may include Extrapolation.
5. **Analytical Statistics:** Analytical statistics uses such methods and techniques that are helpful in setting up functional relationships amidst variables. In this correlation, regression, association and attributes techniques are used.
6. **Mathematical Statistics:** It deals with the application of different mathematical theories and techniques to develop different statistical techniques. It uses techniques like integration, differentiation, trigonometry, matrix, etc.

Descriptive Statistics and Inferential Statistics, Both types of statistics are equally employed in the field of statistical analysis.