TITLE OF E-CONTENT

INTRODUCTION TO STATISTICS
Definition, Nature, Importance and Limitations

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INTRODUCTION TO STATISTICS
Definition, Nature, Importance and Limitations

Objective of the E-Content: The aim of the present E-content is to enable the economics graduate student to understand the meaning, definition and nature of statistics. Moreover, the importance and limitations of statistics is also discussed in this chapter.

"A knowledge of statistics is like a knowledge of foreign language of algebra; it may prove of use at any time under any circumstance".....Bowley.

INTRODUCTION

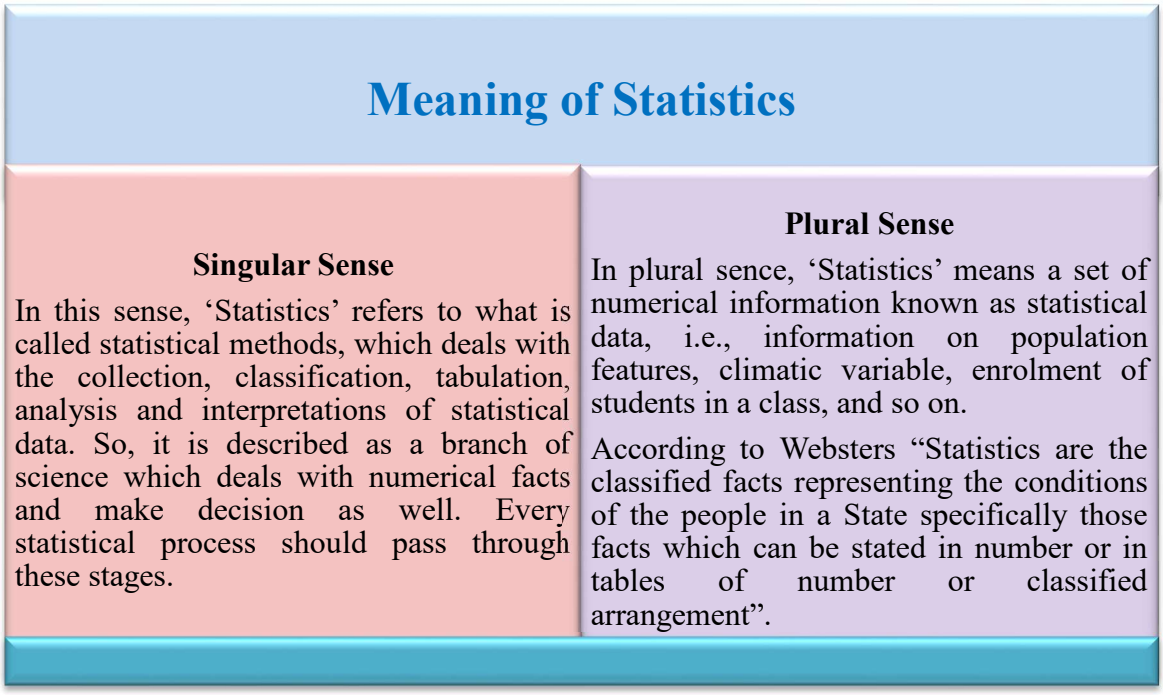
The meaning of statistics word is varying to the different person. In day to day human life, the knowledge of this subject is use in different ways. We have used statistics for personal purpose as well as professional purpose. In personal life, we have used statistics for general calculation of household budget. Generally, there are two type of information i.e., quantitative and qualitative information. Thus, this subject is used by the people to take appropriate decision about the problems/ budget on the basis of the both types of information's.

Statistics is the part of mathematical science which pertains to the collection, classification, tabulation, analysis, interpretation and presentation of data. Some of the eminent researchers consider Statistics to be a separate mathematical science rather than a branch of mathematics. On the other hand, many scientific investigations make use of data, Statistics is concerned with the use of data in the background of uncertainty and judgment making in the face of uncertainty.

MEANING OF STATISTICS

The word of statistics has been derived from the 'status', which is Latin word **OR** 'Statista' which is Italian word. In the18th century, Prof. G. F. Achenwall has been used it first time. These words were used for political state of the region during early period. The Italian word 'Statista' was used to maintain the records of census or data related to wealth of a state/ nation. Successively, the meaning and usage of statistics extended and there onwards its nature also changed. For a common man, 'Statistics' means numerical information expressed in quantitative

terms, which may relate to objects, subjects, activities, information, phenomena, or regions of space. The word statistics can be defined in two broad different ways, because it is used to convey different meanings in singular and plural sense.



DEFINITION OF STATISTICS

The definition of statistics has been given by the different statistician in different ways. Some important definitions of statistics are given below;

A. L. Bowley defined that "Statistics may be called the science of counting". He also said that "Statistics may rightly be called the science of average".

According to Boddington "Statistics is the science of estimates and probabilities".

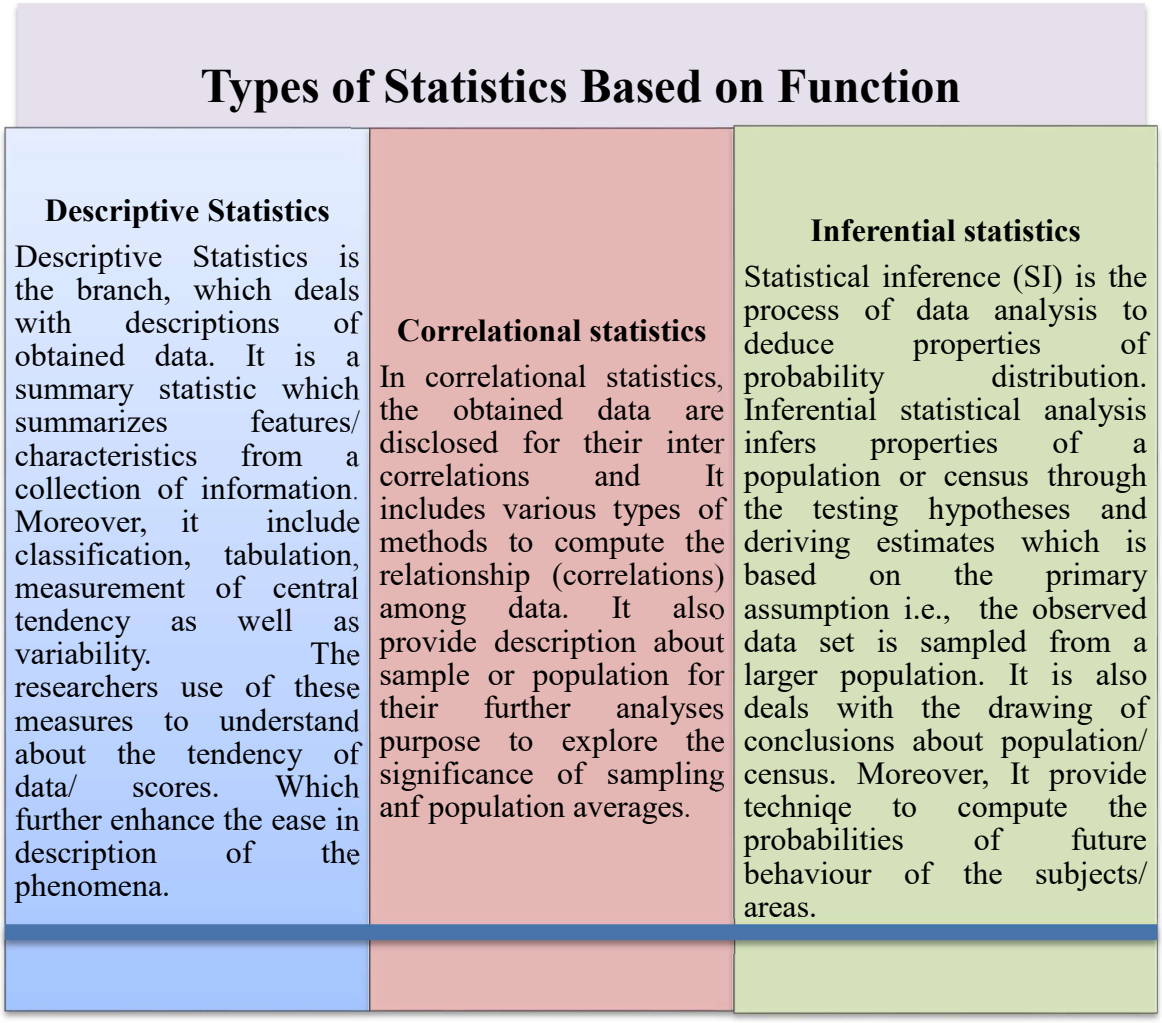
According to Selligman "Statistics is the science which deals with the methods of collecting, classifying, tabulation, comparing and interpreting numerical data collected to throw some light on any sphere of enquiry".

Croxton and Cowden defined that "statistics as the collection, tabulation, presentation, analysis and interpretation of numerical data".

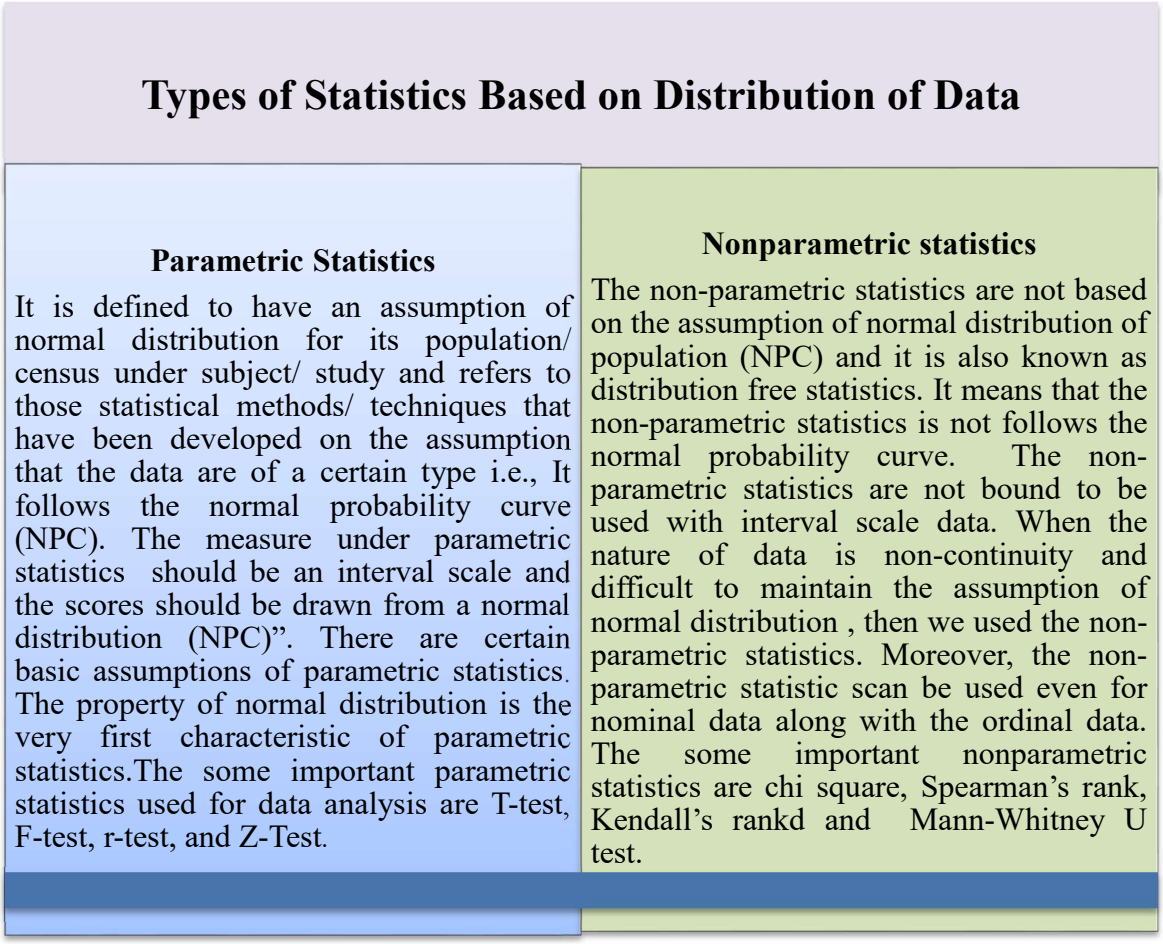
TYPES OF STATISTICS

There are the two broad ways of classifying statistics, one is the on the basis of function and another is the on the basis of distribution of data.

Statistics Based on Function: There are three types of statistics on the basis of subject matter/ function. The types of statistics based on function have been given in following chart;



Statistics Based on Distribution of Data: There are two types of statistics i.e., parametric and nonparametric statistics on the basis of distribution of data. The types of statistics based on distribution of data have been given in following chart;



CHARACTERISTICS OF STATISTICS/ STATISTICAL DATA

The characteristics of statistics can be divided in two groups on the basis of its meaning;

- **Characteristics of Statistical Data**
  - Statistics is the aggregates of facts
  - Statistics/ data can be represented in numbers.
  - Statistics/ data are affected in sufficient quantity for a variety of reasons.
  - Calculation of data or estimation accuracy is based on some level of significance.
  - The compilation of data is on pre-determined objects.
  - The data/ figure must be individually independent.
  - The data are presented in a mutually related form.

- **Characteristics of Science of Statistics**
    - Statistics is a group of methods or techniques.
    - Use of statistical science is almost universal.
    - Statistics deals with the aggregate of numerical facts
    - Statistics is both a science and an art.

SCOPE AND DIVISION OF STATISTICS

It can be divided into two parts;

- **Statistical Methods:** Johnson and Jackson said that "Statistics is the process of the methods which are related to collection, classification, tabulation, analysis, interpretation and presentation of data."
    - Collection of data
    - Organisation of data
    - Presentation of data
    - Analysis and interpretation of data
    - Forecasting of data

- **Applied Statistics**

    - **Descriptive Statistics:** In this, the data compiled in the past or present of region is studied.
    - **Scientific Applied Statistics:** Its help to construct scientific laws of behavioural science and its confirmation.

IMPORTANCE OF STATISTICS

There is the wide importance of Statistics in several areas/ subject. Statistical applications have a wide scope and uses. Some of the major importance's are given next page:

IMPORTANCE OF STATISTICS

- **Policy Planning**: To finalise a government or individual policy, it requires some relevant data from previous documents or expected environment that the policy can be effectively utilised with maximum favourable benifits/ results.
- **Behavioural and Social Sciences**: In social sciences specially in Economics, the both types of information i.e., quantitative and qualitative are used to analysis and draw policy recommendations. Moreover, statistics helps the academician/ researchers to alter the information in a comprehensive way to analysis and predict the patterns of behaviour or trends.
- **Pure and Mathematical science:** The tools of statistical are also used to have precise measures in pure and mathematical sciences and to see differences on different occasions in various conditions.
- **Education Sector:** The statistical tools or instruments is also used in the area of education. Statistics used to create patterns and trends of variables on the basis of past and present conditions and hence showing the direction of development in educastion sector. Further, these trends helps to crates the policies and planning of the education.
- **Management and Commerce:** Statistics is very useful tool in management and commerece. It organisation the various aspects of work and well being of the employees. It is also a very usefull instrument for account, which is the branch of commerece. Moreover, it also keep an eye on the progress trend of the organisation.
- **Industries and Service:** Statistics is a basic tool to analysis the progress of industry as well as service sector and it also hepls to make futher strategies for the development of these sectors.
- **Problem Solving Technique:** Statistics is provide the problem solving tool between two or more variables. To find out the best applicable solution to a problem situation, we can use statistical technique and it is possible because of statistics.
- **Theoretical Researches:** On the basis of statistical analysis, we can establish the significance relationship of those facts for a particular paradigm or phenomena, which theories evolve the facts obtained from the field.

IMPORTANCE OF STATISTICS IN ECONOMICS

In reality, statistics and its techniques are very useful in analysis of economics and its branches.

- **Statistics and Consumption**
- **Statistics and production**
- **Statistics and Exchange**
- **Statistics and Distribution**
- **Statistics and Public Finance**

About the importance of statistics in economics, Bowley said that "No student of political economy can pretend to complete equipment unless he is a master of the method of statistics and knows its difficulties".

LIMITATIONS OF STATISTICS

Although, statistics has a very extensive application in everyday life of human as well as in social, physical, pure and mathematical sciences but it has certain limitations also. These

limitations are given in the following chart:

Limitations of Statistics

- The first serious limitation of Statistics is that, it deals with aggregate of facts and not with single observation. Therefore, the methods of statistics do not give any recognition to an individual person/ object/ event.
- The next limitations of statistics is that it deals mostly with numerical data. So, statistics is more applicaple to those phenomenon which can be measured quantitatively not qualatively. However, qualitative phenomenon can be applied indirectly through the some ststistical techniques.
- The third important limitation of statistics is that, its conclusions are true only on the average or aggegates.Therefore, statistical inferences may not be considered as exact like conclusions based on Mathematical laws or Mathematical sciences.

DISTRUST AND MISUSE OF STATISTICS

Sometimes, the statistical tools have been used by the irresponsible and inexperienced people to fulfil their self-reason/ motive. The various misuses of statistical tools sometimes called an unscrupulous science. There are the following misgivings about Statistics;

Distrust and Misuse of Statistics

- "Statistics can prove anything" — *Bowley*
- "Statistics is an unreliable science"
- "Facts are stubborn things, but statistics are pliable." — *Mark Twain*
- "An ounce of truth will produce tons of Statistics"
- "Figures do not lie, liars figure."
- "There are three types of lies , namely, lies, damned lies, and statistics." — *Benjamin Disraeli*

So, we should be taken care and precautions for the interpretation of statistical data and its results. "Statistics should not be used as a blind man uses a lamp-post for support instead of illumination" - Andrew Lang

Selected Readings

- Gupta, S.C.(1990) *Fundamentals of Statistics*. Himalaya Publishing House, Mumbai
- Jay L. Devore: *Probability and Statistics for Engineering and the Sciences,* Cengage learning,
- Murray R. Speigel : *Theory & Problems of Statistics*, Schaum's publishing Series.