

MEANING

Statistics has been defined differently by different writers from time to time, emphasizing precisely the meaning, scope and limitations of the subject. Some authorities have defined Statistics as statistical data (Plural Sense), whereas others as statistical methods (Singular Sense).

- In Plural Sense, it means a collection of numerical facts.
- In Singular Sense, statistics deal with the collection, presentation, analysis and interpretation of the quantitative information.

Statistics as Numerical set of data (plural sence)

According to A. L. Bowley, statistics are numerical representations of facts arranged in relation to one another in any field of study.

According to Kendall and Yule. "By statistics we mean quantitative data affected to a marked extent by multiplicity of causes."

Prof. Horace Sacrist provided the most thorough and detailed definition of statistics. He states that the term "statistics" in the plural refers to collections of facts that are significantly impacted by a variety of factors, expressed numerically, listed, or estimated using acceptable accuracy standards, gathered methodically for a specific goal, and arranged in relation to one another.

Characteristics of statistics

1. **Aggregates of Facts:** A statistic is a collection of facts. Since single and isolated figures cannot be compared or inferences derived from them, they are not considered statistics. For instance, a single 30-year-old is not a statistic; rather, a series of ages pertaining to a group of people is.
 - It must be noted that all Statistics are expressed in numbers, but all numbers are not Statistics.
 - It is only the aggregate number of facts that is called Statistics.
 - For example, average marks (say, 75) in a class, will be called statistics.
2. **Affected by multiplicity of causes:** A wide range of circumstances affect numerical figures, or statistics. Examining the effects of a single element in isolation while excluding other influences is a difficult task.
3. **Statistics are expressed numerically:** A subject is approached statistically. Therefore, any information that is stated numerically or quantitatively qualifies as statistics.)
 - For example. Isha is taller than Ananya and Mollie; they won't be referred to as statistics. On the other hand, we will refer to the same facts as statistics if they are expressed as numbers (e.g., Isha: 160 cm, Mollie: 154 cm, Ananya: 127 cm).

- Qualitative features, such as intelligence, beauty, honesty, etc., cannot be measured quantitatively enough to be included in statistics unless they are scored as a quantitative assessment tool.
4. **Statistics should be collected with reasonable standard of accuracy:** Data is gathered for statistics with a reasonable standard of correctness. Statistics does not require a high degree of accuracy, unlike accountancy or mathematics, because a large amount of data is involved. Only a respectable level of accuracy may be attained through the process of generalization.
 5. **Statistics are collected for a pre-determined purpose:** If the objective of gathering statistical data is not predetermined, the data acquired will not be very valuable. Confusion and an incomplete understanding of the aim of data collection will prevent the formation of sound conclusions from the data.
 6. **Statistics collected in a systematic manner:** Data accuracy and dependability require that the figures be gathered in an organized way. The credibility of such data will decline if the figures are gathered randomly. Thus, an appropriate plan for data gathering should be created prior to data collection.
 7. **Statistics should be placed in relation to each other:** Typically, the goal of gathering statistical data is to compare.
 - A significant portion of the relevance of the collected figures is lost if they are not comparable.
 - Data must be homogenous (uniform or identical) in order to be used for comparison.
 - For instance, comparing the heights of trees and men would be pointless due to the heterogeneous nature of these data. These numbers do not fit into the statistical definition.

Statistics as a method (singular sense)

In singular sense, the term 'statistics' means statistical methods, i.e. it is a method of dealing with numerical facts. Statistics in singular sense may be defined as the collection, presentation, analysis and interpretation of numerical data.

Stages of statistical study

1. **Data collection:** The primary and initial stage of every statistical investigation is data collection. The goal of the study will determine the data collection method. The information gathered must come from trustworthy and legitimate sources.
2. **Data Organization:** Following gathering, the data is properly organized by editing and classification.
3. **Data Presentation:** Following classification, the data is presented in a format that is appropriate, such as a table, graph, diagram, or text.
4. **Data Analysis:** After the data is presented, analysis is carried out using elementary mathematical methods. These consist of correlation and regression analysis, measures of dispersion, central tendency, and so on.

5. **Interpretation of Data:** It is the last step in the statistical methodology.
- The process of extracting meaning from analyzed data requires statistical reasoning, expertise, and experience.
 - The ultimate findings derived from the data analysis are provided by the interpretation.

FUNCTIONS OF STATISTICS

Statistics performs many functions useful to human beings. The broad functions performed by statistics are discussed as under:

1. **To make complex facts simpler:** It can be exceedingly challenging for a person to comprehend and draw conclusions from large amounts of numerical data. The goal of statistical approaches is to condense the vast amount of complex data into a form that is easy to comprehend.
2. **To present facts in definite form:** Compared to qualitative and abstract facts, quantitative facts are more readily believed and trusted. The broad facts are condensed and given a specific format by statistics.
3. **To compare facts:** Since absolute figures have a less tangible significance, comparison is one of statistics' primary purposes. Many statistical techniques, such as averages, rates, percentages, ratios, etc., are used to compare data.
4. **Make planning and policy creation easier:** Businesspeople and administrators may plan future operations and formulate policies based on numerical data and their analysis.
5. **To assist in forecasting:** Since business is rife with risks and uncertainties, accurate forecasting is crucial to lowering those uncertainties. The use of statistical tools, such as time series analysis and interpolation, is helpful for projecting the future.
6. **Formulation and Testing of Hypotheses:** The formulation and testing of hypotheses benefit greatly from the application of statistical methods.
For instance, we can test the hypothesis that an increase in railway fares will have an impact on passenger traffic or not using the use of statistical tools.
7. **To enlarge individual knowledge and experience:** Statistics helps people learn new things and gain new experiences. It aids in the formulation of new theories and notions and sharpens the power of rational thought and reasoning.

IMPORTANCE OF STATISTICS

1. Statistics' Significance to Government

The ancient kings employed statistics as a means of evaluating their economic and military might. Its purview was gradually expanded to include additional issues pertaining to economic and political activity.

- In the current situation, the government gathers the most data for a variety of uses.
- In order to accomplish the goals of welfare and ensure the smooth operation of government operations, the role of government has grown and it now needs a lot more data in the form of numerical values.
- Economic strategies are heavily reliant on popular statistical techniques including demand analysis, forecasting, index numbers, and time-series analysis.
- In a democratic nation such as India, the popularity of different political factions among the general public is also taken into consideration via statistical analysis.

2. Importance of Statistics in Economics

- (i) **Creation of Economic Laws:** The Inductive approach of generalization, which is also founded on statistical principles, is responsible for the development of the well-known Law of Demand and the idea of "Elasticity of Demand."
- (ii) **Aids in comprehending and resolving an economic issue:** Statistical information and statistical techniques are essential for comprehending and resolving issues related to the distribution of wealth and income, unemployment, poverty, and other issues.
- (iii) **Study of market structures:** Researching oligopolies, monopolies, perfect competition, and other market structures necessitates statistical comparisons of market pricing, business costs, and profits.
- (iv) **Assists in creating mathematical relations:** The mathematical relations between different economic variables can also be estimated by statistical approaches.
- (v) **Beneficial for examining economic notions behavior:** The behavior of prices, the production and consumption of commodities, the flow of money, bank deposits and clearings, and money in circulation are all studied using trend-series analysis.
- (vi) **Price Analysis:** Researching price theories, pricing practices, and price trends, as well as how they relate to the broader issue of inflation, is made easier with the use of statistical price surveys.

3. Importance of Statistics in Economic Planning

In order to maximize the nation's resources and achieve a faster pace of growth, economic planning is essential.

In economic planning, statistics and numerical data are essential at every level.

- The quantity of different resources accessible in the economy can be evaluated using statistical approaches, and from there, it is feasible to determine whether or not the stated pace of growth is sustainable.
- An economy's critical sectors, such as the rising rate of inflation, may become apparent through statistical analysis of available data and may need rapid intervention.

4. Importance of Statistics in Business

- (i) **Establishing a company Unit:** It's important to determine the viability of a company venture before launching it. It includes comprehensive data regarding the following: location, output volume, input availability, taxes, market share, turnover, etc. Guidelines from statistics can be useful when making important judgments.
- (ii) **To Estimate Product Demand:** After a firm is launched, the following stage is to estimate both the current and future demand for the product. In order to create trend lines that result in accurate forecasting, statistical techniques are quite beneficial.
- (iii) **Regarding Production Planning:** The entrepreneur must schedule his production to fulfill product demand while minimizing losses from excess or underproduction. Precautionary production scheduling is necessary to keep supply and demand in balance.
- (iv) **To Create Quality Control:** Statistical methods (such as creating control charts) can also be utilized to manage the caliber of the goods that a company produces.
- (v) **For Developing Marketing Strategy:** The market research team uses a variety of statistical tools (such as pilot surveys) to analyze data on the population, purchasing power, customer behavior, rivals, price, etc. prior to the launch of a product. These studies highlight the product's prospective market.

LIMITATIONS OF STATISTICS

- 1. Statistics does not study qualitative phenomena:** Only problems that can be defined and described quantitatively can be studied using statistics.
It is impossible to quantify qualitative traits like integrity, poverty, welfare, attractiveness, health, etc. directly
- 2. Statistical results are true only on average:** Compared to many other fields, statistics is not as precise as it can be. Because the findings of the natural sciences are generally true, they are accurate. Statistical rules are not accurate, though. For instance, just because three thefts occur on the first day of the week does not guarantee that there won't be any more in that town if the average number of thefts is three each week.
- 3. Statistical laws are not exact:** Inferences drawn from statistical laws are simply approximations, not exact conclusions like those drawn from mathematical or scientific rules because statistical laws are probabilistic in nature.
- 4. Only Experts can make the Best Possible use of Statistics.** Statistics methods are not so easy for a layperson to employ. Because these techniques are complex, only specialists should utilize them.
- 5. Statistical data should be uniform and homogeneous:** It is imperative that the data be homogeneous and consistent. Data that are heterogeneous cannot be compared. Comparing the heights of trees and men, for instance, would be meaningless due to the heterogeneous nature of the data.