

# ***Population and sample***

## **Definition of Statistics: -**

Statistics can be defined as the collection, presentation, analysis and interpretation of data.

## **Importance of statistics: -**

1. statistical methods enable to condense the data. It facilitates several functions apart from summarization.
2. statistical methods give tools of comparison.
3. estimation, prediction is also possible using statistical tools.
4. we can get idea about the shape, spread, symmetry of the data.
5. inter-relation between two or more variables can be measured using statistical technique.
6. statistical methods help in planning, controlling, decision-making etc.
7. the use of statistical methods is important because considerable amount of time, money manpower can be saved.
8. uncertainties can be reduced to get reliable results.
9. statistical methods give systematic methods of data collection and investigation.

## **Population and sample: -**

**Population-** An aggregate of objects or individuals under study is called population or universe.

**Sampling-** Any part of population under study is called a sample.

## **Illustration-**

1. while purchasing food grains, we inspect only a handful of grains and draw conclusion about the quality of the whole lot. In this case, handful of grains is a sample and the whole lot is a population.
2. while examining blood of an individual, a few drops are taken out of human body for diagnosis. These drops form a sample whereas entire blood in the body is a population. In this case, conclusions based on sample are accepted for population with any doubt as far as the method is concerned. In this case, census is impracticable. Sampling method is appealing in such situations.
3. for testing quality of milk, a small quantity of milk is tested instead of entire bulk. The quantity of milk used for testing is a sample and the entire bulk is population.
4. a housewife confirms whether the food is properly cooked or not with the help of few particles taken out of the container. Clearly, the food in the container is a population, whereas food taken out of container for inspection is a sample.

## Advantage of sampling over census: -

**1.Reduced time-** as compare to census, sample consists of a less number of elements. Hence there is a considerable reduction in processing time. The results can be obtained quickly due to time saved in data collection and further analysis.

**2.Reduced cost-** there is reduction in cost, both in terms of time and manpower. Therefore, expenses incurred in collection of data and its analysis are always less than those in census. Thus sampling is economical.

**3.Greater accuracy-** as compared to census, only limited number of elements are to be processed. Therefore, sophisticated machinery, well-trained staff can be used and accuracy can be increased. Due to the reduced volume of work, it can be completed efficiently and without fatigue. Moreover, elements will be free from non-sampling error such as incompleteness of return, biases due to interview, inaccurate return etc.

## Types of sampling: -

**1.) Simple random sampling (SRS):-**It is easier and most commonly used method of sampling. In this method each element of population is selected at random (i.e. in impartial manner) and have same chance of getting selected in the sample.

**A) Simple random sampling with replacement (SRSWR):-** In this method, first elements is selected at random from the population. It is recorded or studied completely and then replaced back in the population. Afterwards second element is selected similarly. This process is continued till a sample of required size is selected. In this method population size remain the same at every draw. This method of sampling is called as simple random sampling with replacement.

**B) Simple random sampling without replacement (SRSWOR):-** There is another procedure of selecting elements in which, elements are selected at random but those are not replaced back in the population. This method of selecting sample is called as simple random sampling without replacement. In this method population size goes on decreasing at each draw. The drawback of getting the Same elements selected more than once is overcome in SRSWOR.

**2.) Stratified random sampling: -** If population is not homogeneous, SRS is not very effective. Therefore, the entire population is divided into several homogeneous group called as strata (singular stratum). A Simple random sample of a suitable size is selected from each stratum and then combining these sampled observations we can form a sample. The sample thus formed is called as a stratified random sample.

