

Sampling:

Why do you need sampling?

Description of any statistical tool starts with “Let x_1, x_2, \dots, x_n be a random sample from population....”

Based on this sample, the statistical analysis is conducted.

As a matter of fact, statistics has utility only because it can provide statistical inferences for the entire population using the sample data.

Sampling:

How to obtain these “ x_1, x_2, \dots, x_n ” ?

If these “ x_1, x_2, \dots, x_n ” are good, we get good inferences.

If these “ x_1, x_2, \dots, x_n ” are bad, we get bad inferences.

Entire success of statistical tools depends upon the outcomes and the outcome depends upon the quality of sample used in the analysis.

Sampling:

Sampling theory helps.

It provides methodologies for choosing “ x_1, x_2, \dots, x_n ” .

The methodologies ensures that the “ x_1, x_2, \dots, x_n ” are “good” and as per the requirements of the statistical tools to be used.

Sampling:

Sampling theory provides the tools and techniques for data collection keeping in mind the objectives to be fulfilled and nature of population.

These are two ways of obtaining the information

1. Sample surveys

2. Complete enumeration or census

Sampling:

- **Sample surveys collect information on a fraction of total population whereas**
- **the information on whole population is collected in census.**

Some surveys are conducted regularly like economic surveys, agricultural surveys etc.

Some surveys are need based and are conducted when some need arise, e.g., consumer satisfaction surveys at a newly opened shopping mall to see the satisfaction level with the amenities provided in the mall .

Sampling Unit:

An element or a group of elements on which observations can be taken is called a sampling unit.

The objective of the survey helps in determining the definition of sampling unit.

Definition of sampling unit depends and varies as per the objective of the survey.

Sampling Unit:

Example:

Objective: To determine the total income of all the persons in the household.

Sampling unit: Household.

Example:

Objective: To determine the income of any particular person in the household.

Sampling unit: Income of the particular person in the household.

Sampling Unit:

Example:

Objective: To study the health conditions.

Sampling unit: The person on whom the readings on the blood sugar level, blood pressure and other factors will be obtained.

These values will together classify the person as healthy or unhealthy.

Sampling Unit:

Example:

Objective: A fish food increases the weight of the fish or not.

Sampling unit: What is sampling unit?

Weight of fish or weight of aquarium?

Population:

Collection of all the sampling units in a given region at a particular point of time or a particular period is called population.

Example:

Objective: Medical facilities in a hospital are to be surveyed through the patients.

Population: Total number of patients registered in the hospital during the time period of survey.

Population:

Example:

Objective: To study the production of wheat in a district.

Population: All the fields cultivating wheat in that district.

Population:

Population size: Total number of sampling units in the population.

Denoted generally by N .

The population size can be finite or infinite (N is large).

Census:

Complete count of population is called census.

The observations on all the sampling units in the population are collected in a census.

For example, in India, the census is conducted at every tenth year in which observations on all the persons staying in India is collected.

Sample:

Collection of One or more sampling units selected from the population according to some specified procedure.

A sample consists only of a portion of the population units.

Representative Sample:

All salient features of population are present in the sample.

Every sample has to be a representative sample.

For example, if a population has 30% male and 70% female, then we also expect the sample to have nearly 30% male and 70% females.

Representative Sample:

In another example, if we take out a handful of wheat from a 100 Kg. bag of wheat, we expect the same quality of wheat in hand as inside the bag.

It is expected that a drop of blood will give the same information as all the blood in the body.