

SAMPLING TECHNIQUES



INTRODUCTION

- **Population** is the collection of all observations about which conclusions are to be made. The population may be finite or infinite.
- If each and every unit in the population is considered in the enquiry, it is called **census** or **complete enumeration**.
- As the population in most enquires are quite large, census is not feasible.
- In such cases, a representative part of the population is taken into consideration. It is known as **sample**.
- Each unit in the population is called a **sampling unit**.
- The list of all sampling units of the population is called **sampling frame**.

SAMPLING

- *Sampling* is the science and art of controlling and measuring reliability of useful statistical information through the theory of probability.
- When only a part, called a sample is selected from the population and examined, it is called sample enumeration or sample survey.
- A sample survey will be less expensive than a census survey and the desired information will be obtained in less time.
- A well- conducted sample survey can provide much more precise results than a census survey.

SAMPLING

- Advantages
 - Reduced cost of survey
 - Greater speed of getting results
 - Greater accuracy of results
 - Greater scope
 - Adaptability
- Disadvantages
 - Improper sampling technique may lead to misleading results.
 - If information is required from each and every unit of population, sampling is inadequate.

PRINCIPLES OF SAMPLING THEORY

- ❖ Principle of validity
 - States that the sampling design provides valid estimates about population parameters.
- ❖ Principle of statistical regularity
 - Stresses upon the desirability and importance of selecting sample designs
- ❖ Principle of optimization
 - Stresses upon obtaining optimum results with minimization of the total loss in terms of cost and mean square error.

ERRORS IN SURVEY

- The errors involved in the collection, processing and analysis of data may be classified as
 - i. Sampling errors
 - ✓ seen in sample surveys
 - ii. Non- sampling errors
 - ✓ present in both census and sampling
- Sampling error decreases as sample size increases.
- Non sampling error increases with increase in sample size

PRINCIPAL STEPS IN SAMPLE SURVEY

- 1) Statement of objectives
- 2) Definition of population
- 3) Determination of sampling units and sampling frame
- 4) Selection of proper sampling design
- 5) Organization of field work
- 6) Summary and analysis of data
 - i. Scruting and editing
 - ii. Tabulation
 - iii. Statistical analysis
 - iv. Reporting and conclusions

METHODS OF SAMPLING

- There are essentially two types of sampling methods:
 - Probability sampling
 - Non probability sampling
- In **Non Probability sampling**, members are selected from the population in some non- random manner. These methods are subjective.
- **Probability sampling** is the scientific method of selecting samples according to some laws of chance in which each unit in the population has some definite pre- assigned probability of being selected in the sample.

NON PROBABILITY SAMPLING

- These includes:
 - ❖ **Convenience sampling**
 - Is obtained by selecting convenient population units.
 - The sample is drawn according to the convenience of the investigator.
 - ❖ **Judgment sampling**
 - The sample is selected with definite purpose in view.
 - Is very useful when you need to reach a targeted sample quickly.
 - ❖ **Quota sampling**
 - Quotas are set up according to some specified characteristics such as several income groups.
 - Within the quota the selection of sample items depends on personal judgment.
 - Used in public opinion studies & personal interviews and people are systematically according to some fixed quota.

PROBABILITY SAMPLING

- This method is purely objective.
- Different types of probability sampling includes:
 - ❖ Simple Random Sampling
 - With replacement
 - Without replacement
 - ❖ Systematic Sampling
 - ❖ Stratified Sampling
 - ❖ Cluster Sampling
 - ❖ Multistage Sampling

SIMPLE RANDOM SAMPLING

- Each member of the population has an equal probability of being selected.
- This method is applicable when population is homogeneous.
- There are two types of SRS
 1. SRSWR
 2. SRSWOR
- If a population consists of N units and a sample of n units to be taken, then the possible number of samples in
$$\text{SRSWOR} - {}^N C_n$$
$$\text{SRSWR} - N^n$$
- Random samples can be obtained by any of the following methods
 1. Lottery Method
 2. Random Number Table Method
 3. Remainder Method

SYSTEMATIC SAMPLING

- A sampling method in which one unit is selected at random and the remaining units are selected at an interval of predetermined length.
- There are two types of sample selection procedures:
 1. Linear Systematic Sampling
 2. Circular Systematic Sampling
- Its estimates are more efficient than SRS and is widely used in various types of surveys.
- Systematic sampling is commonly used technique if a complete and upto data sampling frame is made available.

STRATIFIED RANDOM SAMPLING

- When the population is heterogeneous, it is first subdivided into non overlapping exhaustive homogeneous subgroups. These are called strata or stratum.
- Each member of the population is assigned to a stratum, then a simple random sample is selected from each stratum.
- There are 4 methods of allocations of sample size to different strata in stratified sampling procedure.
 1. Equal Allocation
 2. Proportional Allocation
 3. Neymann Allocation
 4. Optimum Allocation

CLUSTER SAMPLING

- In cluster sampling, the total population is divided into some recognizable subdivisions which are termed as clusters and a simple random sample of these clusters is drawn.
- These clusters are examined completely.
- Example:

Population	All school students in the district
Clusters	Each school in the district
Obtain SRS of clusters	Four schools from the district
Sample	Every student in the four schools

MULTI- STAGE SAMPLING

- Multistage sampling refers to a sampling technique which is carried out in various stages.
- It consists of sampling first stage units by some suitable method of sampling.
- From among the selected first stage units, a sub sample of secondary stage units is drawn by some suitable method of sampling which may be same or different.
- Further stages may be added to arrive at a sample of desired sampling units.
- If the sampling is done only in two stages, it is called Sub- sampling.