

SAMPLING

Definitions

Population:

The collection of all the objects under study is called a population.

OR

The Universal set of Objects having some common properties is known as the population.

OR

The group of individuals living or non-living under study is known as the population.

Examples:

- 1) If we want to study the economic conditions of all the commerce students in A.R.P. Kanya Mahavidyalaya, Ichalkaranji. Then the group of all the students who studied commerce in A.R.P. Kanya Mahavidyalaya, Ichalkaranji is our population.
- 2) If we want to study the average height of students at Shivaji University. In this case, the group of all the students who studied at Shivaji University is our population.

The population is subdivided into two types,

1) Finite population:

A population containing a finite number of individuals is known as a finite population.

e.g. the books in a library, the Total number of students in the college, etc.

2) Infinite population:

A population containing an infinite number of individuals is known as an infinite population.

e.g. stars in the sky, the number of germs in the patient's body etc.

Sample:

A part of the population is known as a sample.

OR

The finite subset of the population is known as the sample.

e.g.

1) Population: All the students in the college

Sample: Select the students who studied statistics in college.

2) Population: All registered voters in a city

Sample: A systematic selection of 500 voters from the city's voter registration list

Sampling:

The process of selecting the sample from the population is known as Sampling.

OR

The information collected from only a few selected units from the population is called sampling.

e.g.

1) For the few drops of blood collected from the body will be a sample and testing these drops is a sampling technique.

Census or Complete enumeration (Counting) method:

The method of collecting the information from each and every individual or item is called as census method.

e.g. If we collect information from each and every household in a certain city is the census method or Complete enumeration (Counting) method

Principal steps in the sample survey:

The following are the principal steps in the planning and execution of the sample surveys:

1. **Objectives and Scope of the Survey:** Clearly define the purpose and goals of the survey. Determine the specific information you want to collect and the scope of the study. This step sets the direction and focus of the survey.
2. **Defining the Population to be Sampled:** Identify the target population that the survey aims to study. The population is the entire group of individuals or items that possess the characteristics of interest for the survey.
3. **The Frame and Sampling Units:** Create a sampling frame, which is a list or representation of all the elements in the target population. Sampling units are the

individual members or items within the sampling frame that can be selected for the sample.

4. **Data to be Collected:** Determine the data needed to achieve the survey objectives. Specify the variables and measurements required for analysis.
5. **The Questionnaire or Schedule:** Develop a structured questionnaire or survey instrument to collect data from the selected sample. Ensure that the questions are clear, unbiased, and relevant to the research objectives.
6. **Method of Collecting Information:** Decide on the data collection method, such as face-to-face interviews, telephone surveys, online surveys, or mailed questionnaires. Choose the method that best suits the nature of the study and the target population.
7. **Non-Respondents:** Account for potential non-response bias and develop strategies to minimize non-response. Non-respondents are individuals who do not participate in the survey, and their absence could affect the representativeness of the sample.
8. **Selection of Proper Sampling Design:** Choose an appropriate sampling design based on the survey objectives, available resources, and characteristics of the target population. Common sampling designs include simple random sampling, stratified sampling, cluster sampling, and systematic sampling.
9. **Organisation of Field Work:** Plan and organize the logistics of data collection. Train survey enumerators or interviewers if needed and establish protocols to ensure data quality and consistency.
10. **Pilot Survey or Pre-Test:** Conduct a small-scale pilot survey or pre-test to test the survey instrument, identify potential issues, and make necessary adjustments before conducting the full-scale survey.
11. **Summary and Analysis of the Data:** After data collection, summarize and clean the data. Perform appropriate data analysis using statistical methods or qualitative techniques based on the research objectives. Draw conclusions and present the survey findings in a comprehensive report.

Advantages of sampling over the census:

The advantages of the sampling method over census methods are.

- 1) **Less Time:** Generally, the population is large than the sample, and the study of it will require a lot of time; not only for collecting the data but also for analysis. But as a sample is a part of the population, that's why collection and analysis of it requires very less time as compared to the census method. The census method cannot be used where the results are required quickly. Here sampling method is used. For Blood testing, Check the test of apples in the lot, etc.
- 2) **Less Cost:** It is obvious that the study of the entire population requires a very large cost. Since in sampling only a part of the population is to be studied that's why cost involved will be proportionately less than the census method, and that's why the census method is less expensive than sampling.
- 3) **Reliability:** Though sampling inquiry contains errors carefully designed and scientifically executed some survey gives results that are more reliable than those obtained from a census method.

- 4) **Details of Information:** Due to the small size each and every member of a sample can be studied carefully, and detailed information can be obtained from it. In the census method because of the huge/ large size of the population, this becomes very difficult.
- 5) **Only method applicable:** There are certain situations where we can't use a census method. If the population is too large or spread over a large geographical area, e.g., the study of trees in a jungle/forest, the number of fish in the sea, testing of blood from the patient's body, in these situations we can't use the census method. In these situations, sampling is the only method applicable.
- 6) **Scientific method:** If the population is hypothetical, the sampling method is the only scientific method of estimating the parameters of the population.

METHODS OF SAMPLING:

There are various methods of sampling.

1) Simple Random Sampling (SRS): -

It is a very easiest and most important method of sampling, in which each and every item of the universe or population has the same or equal probability of being included in the sample. If the population consists of 'N' elements, then the probability of any element being included in the sample at any draw is $1/N$.

There are two methods of Simple Random Sampling

a) Simple Random Sampling with Replacement [SRSWR]:

In this method, the first element is selected at random from the population. It is recorded or studied completely and then replaced back in the population. Then the second element is selected similarly. This process is continued till a sample of the required size is selected. In this method, population size remains the same at every draw and the probability of each element selected from the population in a sample is equal to $1/N$ always.

b) Simple Random Sampling without Replacement [SRSWOR]

There is another process of selecting elements in which, elements are selected at random but those are not replaced back in the Population when the second element is drawn, this method of selecting a sample is called Simple Random Sampling Without Replacement.

If however, the sample plan is of simple random sampling without replacement, then after each draw the number of items in the universe decreases or declines. The probability of selection of any item in the first draw would be $1/N$, after this, the probability of selection of the second item from the universe would be the same for all remaining items and it would be $1/N-1$, at the third draw it would be $1/N-2$, and so on i.e., till the probability of last element selected in the sample from the population.

2) Stratified Random Sampling Method: -

This method can be applied when the population is heterogeneous and is divided into homogeneous groups called strata or classes. Samples are selected by considering the relative importance of groups. Stratification means division into groups or strata. After the division of the groups' the important thing is to allocate sample size between various groups. This can be done by using the following methods.

- I) Proportional allocation
- II) Optimum allocation
- III) Dis-proportional allocation.

Examples:

- 1) **Customer Satisfaction Survey:** A company wants to conduct a customer satisfaction survey. The customer base includes various types of customers, such as new customers, regular customers, and long-term customers. To get insights from all customer segments, the company divides its customer database into strata based on customer types and then randomly selects customers from each stratum for the survey.
- 2) we want to conduct a survey to determine the average age of students in a large school. The school has 1,000 students, and they are divided into four grades: 9th, 10th, 11th, and 12th. We are interested in getting a representative sample from each grade using stratified random sampling.
- 3) **Educational Performance Assessment:** A school district wants to assess the academic performance of its students. They divide the student population into strata based on grade levels (e.g., elementary, middle, high school) and further divide each stratum by subject (e.g., math, science, literature). They randomly select students from each stratum to assess their performance in their respective subjects.
- 4) **Election Polling:** A polling agency wants to predict voting behaviour in an upcoming election. They divide the population into strata based on demographics, such as age groups (18-25, 26-40, 41-60, 61 and above). They conduct surveys in each stratum by randomly selecting voters from each age group to get a more accurate representation of voter preferences.