UNIVERSE, POPULATION & SAMPLE: MEANING & CONCEPT

DR. RASHMI GORE

OBJECTIVES OF LECTURE

After this lecture you will be able to

- Define the term population, Sample & Sampling frame.

- Differentiate between Parameter and Statistics.

- Explain Need and advantages of sampling.

- Describe Sampling size and sampling error.

- Differentiate between Sample survey and census survey.

RESEARCH : MEANING

Research may be defined as the scientific method in the study of problem.

According to Best & Kahn(1992) the characteristics of research are:

- Directed towards the solution of problem.

- Emphasis the development of generalization.

- Based upon observable experiences or empirical evidences .

- Stives to be objective, logical and valid.

- patient and unhurried activity

STEPS OF RESEARCH

1. Selection of Problem

2. Formulation of hypothesis

3. Preparation of research design

4. Sampling

5. Collection of data

6. Analysis of data

7. Generalisation of result

CONCEPT OF SAMPLE & SAMPLING

- For research, data is collected from the population. When the population is too large, it is not feasible to collect data from every unit of population. In order to collect requisite data for a research problem researcher select a sample through proper sampling procedure.
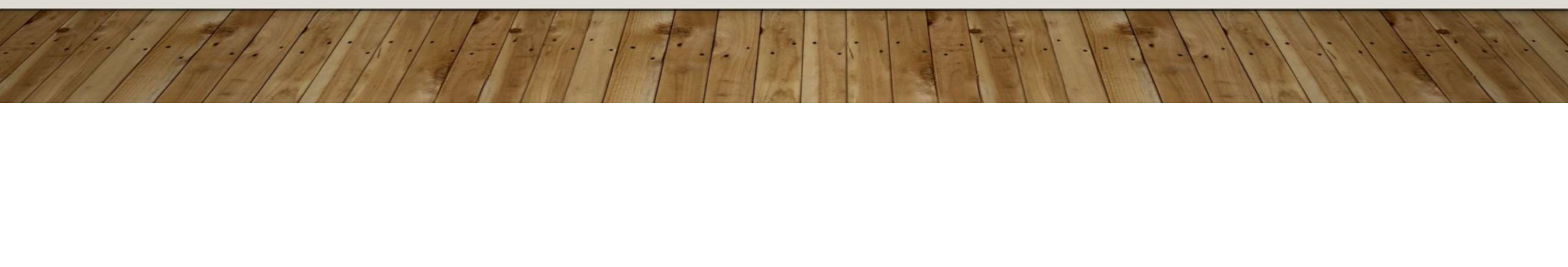
METHODS OF COLLECTING INFORMATION

There are two ways of collecting the information.

1. **Census Method**

2. **Sampling method**

Census method is needed when it is necessary to collect data from all units of population determining-

- Demographical characteristics (gender, caste, race, age, income etc.)

- Educational characteristics (enrolment, drop-out, educational level)

- Familial characteristics (number of children, marital status, occupation, family income)

NEED OF SAMPLING

Sampling method is needed due to following limitations of Census method -

- Difficult to collect data from every respondent specially when the population is large

- Time consuming

- Expensive

- Required more technical expertism

- More chance of error due to greater volume of work etc.

ADVANTAGES OF SAMPLING

- More accuracy
- More speed
- Time saving
- Less expensive

CONCEPT OF SOME FUNDAMENTAL TERMS USED IN SAMPLING

- **Universe**
- **Population** (finite-infinite, existent-hypothetical, homogeneous-heterogeneous)
- **Sample**
- **Sampling frame**
- **Parameter**
- **Statistic**
- **Sampling error**
- **Sampling size**

RELATION OF UNIVERSE, POPULATION AND SAMPLE
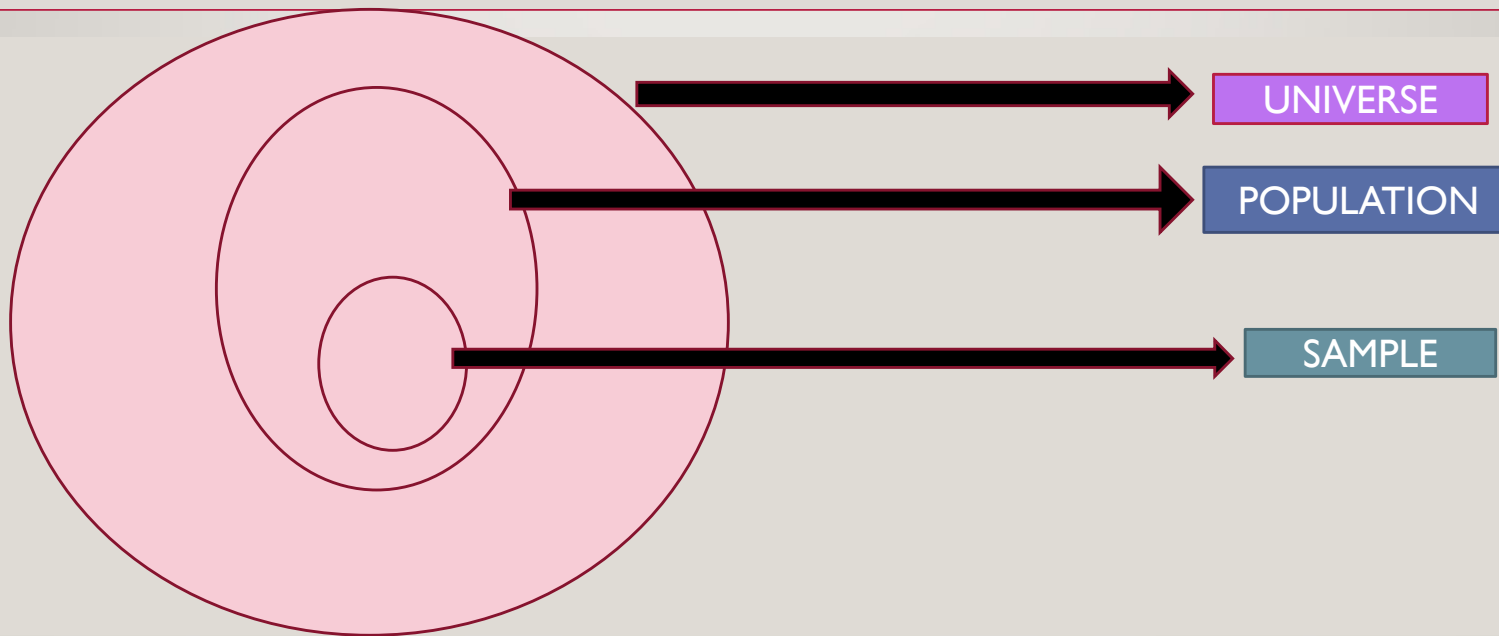
POPULATION

- A population is any group of individuals that have one or more characteristics in common and that are in interest of researcher. (Best & Kahn,1995)

- A population refers to any collection of specified group of human beings or of non human entities such as objects, educational institutions, time units, geographical areas, prices of commodities, salary of an individual etc. (L. Kaul,2010)

SOME EXAMPLES OF POPULATION

- All Ph.D. Scholars

- All University teachers

- All NGO's

- All High school Students

- All Engineering Institutions

- All ountries of Asia

TYPES OF POPULATION

- When a population contains **finite** number of units or individuals are called **FINITE POPULATION.**

Example-

- **Five hundred** workers in a factory.

- **Three lakh** students in CBSE board.

- **Ten thousand** books in the library.

INFINITE POPULATION

- The infinite population is also known as **an uncountable population in which the counting of units in the population is not possible**.

- Can you identify the Example of an infinite population?
  A. The stars in the sky and the four-wheelers in a town.
  B. The stars in the sky and the books in a library.
  C. The car in a town and the books in a library.
  D. Number of points in a line and births of insects.

EXISTENT & HYPOTHETICAL POPULATION

The Population of concrete individuals is known as existent population

Example:

- 50 students of M.Ed. in an institution.

- 60 journals of Educational Technology.

　　　The population in which whose unit is not available in solid form is known as the hypothetical population.

Example:

- Population of head and tails obtained by tossing a coin in an infinite number of times.

HOMOGENEOUS AND HETEROGENOUS POPULATION

- **If the populations are identical** they are said to be homogeneous, and by extension, the sample data are also said to be homogeneous.

- A heterogeneous population or sample is one where the member may have different value for the characteristics researcher are interested in.

SAMPLE

- In research term sample is **a group of people, objects, or items that are taken from a larger population for measurement**. The sample should be representative of the population to ensure that we can generalize the findings from the research sample to the population as a whole.

CHARACTERISTICS OF SAMPLE

- Reflects its population
- Representative
- Valid
- Appropriate size

SAMPLING FRAME

- A complete, accurate and updated list of all units of population required for selecting a sample from given population is called **Sampling Frame.**

Precautions:

- **All units must be listed otherwise it may be incomplete.**

- **Do not list a unit twice**

- **All categories of target population must be included**

- **No old list but updated list must be used**

- **Non existed units not be included**

PARAMETER & STATISTICS

- Parameter is numeric characteristic of a total or complete population while Statistic is a numerical characteristic of a sample drawn from its population.

- The value of statistic is expressed in Roman Letters (**n)** while the value of parameter is written in Greek letters (**N**).

STATISTICS AND PARAMETER SYMBOLS FOR SOME DESCRIPTIVE MEASURES

Sample Statistics	Descriptive measure	Parameters
n	Size	N
M	Mean	M_{Pop} or μ
s	Standard Deviation	σ
S^2	Variance	σ^2
r	Correlation coefficient	r_{pop}

SAMPLING ERROR

Difference between Population mean and sample mean is known as **sampling error.** It is caused by **observing a sample instead of the whole population**. The sampling error is the difference between a sample statistics used to estimate a population parameter and the actual but unknown value of the parameter.

SAMPLE SIZE

- The **sample size** is a term used in research for defining the number of subjects included in a **sample**

- Sample size refers to **the number of participants or observations included in a study**. This number is usually represented by **n**.

- The ideal sample should be large enough for adequate representation of their population, needed for generalization and small enough as per availability, time expense & complexity of data analysis.

SAMPLE SIZE

According to Best & Kahn (1995) several practical observations about sample size are:

- Larger the sample, smaller the magnitude of sampling error.

- When sample groups are to be divided into their sub-groups for comparison, the researcher should take large enough sample to get adequate sample size

- In mailed questionnaire studies a larger initial sample should be taken as the percentage of responses may be as low as 20 to 30 %.

SAMPLE SIZE

- In comparison to experimental studies survey- type researches should have larger samples

- While determining appropriate sample size researcher should also consider for subject availability and time & cost factors.

- When random sampling is employed, whether the sample is large or small, the error of sampling may be estimated.

- In comparison to homogeneous population, a large sample is needed for heterogeneous population.

ESTIMATING THE PARAMETER

- Parameter estimation is **concerned with finding the value of a population parameter from sample statistics.**

- There may be two types of estimation

1. Point estimation

2. Interval estimation

POINT ESTIMATION & INTERVAL ESTIMATION

- In statistics, point estimation **involves the use of sample data to calculate a single value** (known as a point estimate since it identifies a point in some parameter space) which is to serve as a "best guess" or "best estimate" of an unknown population parameter (for an example, if the mean of statistics for a variable is 50, the population mean also be estimated as 50).

- When an interval mean value is estimated for parameters, as in above case mean value for parameter will be estimated within 45 to 55 or 50±. This is **interval estimation**

CHARACTERISTICS OF GOOD SAMPLE

- True representative of its population

- Goal oriented

- Proportional

- Practical

- Unbiasedly selected/randomly selected

THANKS