Population and Sampling:

General meaning of population is all items in the field of inquiry and sample is a smaller representation of larger whole. It is a part of population which is selected to be studied. In every educational research, researcher has to decide a group of individuals having some common characteristic on which researcher wants to do research. It is always a wider group. In statistical term this group of people is called population and the subset of this population is called sample. Let us define population and sample scientifically.

Population:

Definitions of population

A population is any group of individuals that have one or more characteristics in common that are interest to the research.

Population is the larger whole from which the sample is selected.

A population is a collection of people, items or events about which researcher want to make inferences.

A population is a complete set of people with a specialized set of characteristics.

A population is an entire group about which some information is required to be ascertained.

While doing research, researcher has to observe and analyse the small portion of population selected for observation and analysis and make certain inferences about population from which the small portion is drawn. This small portion is called sample. Sample is a subsection or cross section of large group.

Sample:

Definitions of Sample

The selected part from population, which is used to ascertain the characteristics of a population is called sample.

A sample is any part of the fully defined population.

A sample is the selected elements (people or objects) chosen for participation in a study.

A sample is a subset of people, items, or events from a larger population that you collect and analyse to make inferences.

A sample is the group of individuals who actually participate in the research study.

While conducting a research study, before deciding method of collection of data through experimentation, observation, questionnaire or interviews researcher has to decide the sample which is drawn from large group of population. Researcher requires volume of data from population to analyse and interpret the results to arrive at a meaningful conclusions.
Procedure of collecting sample from the population is called sampling. Sampling involves the selection of some part of an aggregate or totality on the basis of which a judgment or inference about the aggregate or totality is made.

**Sampling:**

Sampling is a technique of selecting a representative part of a population for the purpose of determining characteristics of the population.

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Sampling is a technique of extracting representative part of population for study.

Sampling refers to the process of choosing sample from the population so that some inferences about the population can be made by studying the sample.

**Need of sampling:**

At times when it is not possible to study each and every unit in the population or when studying a part of population is sufficient to conclude about the whole, the sampling is resorted to obtain sample.

1. Sampling saves time as sample produces result at a faster speed.
2. Sampling is necessary because researcher usually cannot gather data from the entire population due to large or inaccessible population.
3. If researcher has financial and temporal constraints to collect the data from population, sampling is the better alternative.
4. Through right sampling researcher can provide information within given tolerable limit.
5. Sample study could be more thorough than study of population. This could result in higher quality of the information obtained.
6. Sampling reduces destructive measurement. It is generally conducted by trained and experienced investigators.

**Characteristics of good Sample:**

Usefulness and reliability of sampling depends on the following characteristics of sample-

**Representativeness:**

The sample should be fully representative of the population from which it is drawn.

**Accuracy and precision:**

Good sample should be accurate. It should be free from error due to bias and deliberate selection. Sampling error is the degree to which a sample might differ from population.
Sample should reproduce the characteristics of the population with the greatest possible accuracy. When sample is precise that means researcher expects same amount of fluctuation in population as well as in sample.

**Adequacy:**

In research adequate size of the sample determines the accuracy in result and it can be rightly applicable to the population from it is drawn. Adequacy is the quality of being good enough.

**Randomness:**

Randomness is the quality having no apparent order. Each subject in the population should have an equal chance of being selected. Only when the sample is selected at random, its reliability and representativeness would be achieved.

**Homogeneity:**

It is the quality of all being same or all of the same kind or the same composition throughout. In research all the subject in sample should have similarity in every respect.

**Independence:**

The subjects included in the sample should be independent. The selection of one subject will not influence the selection of others.

**Reliability:**

Sample should be reliable. Properly selected small sample may be relatively much reliable than poorly selected large sample.

**Methods/Techniques/ designs of sampling:**

There are different types of sampling methods based on representativeness and the way of selection. On the representation basis, sampling may be probability sampling or non-probability sampling. Probability sampling is based on the concept of random selection. Non-probability sampling is based on the concept of deliberate selection of sample.

Sampling methods are mainly classified into methods that are probability sampling methods and non-probability sampling methods.

Probability and non-probability sampling method are further classified as:

**Probability sampling methods:**

Probability sampling method can be defined as a method that ensures random sample, a sample which is a representative of the population from which it is drawn.
In probability sampling every subject from population has an equal and independent chance of being included in the sample.

**Probability sampling methods are as follows:**

**Simple random sampling:**

Simple random sampling is the purest form of probability sampling. It is a technique in which every subject from population has equal and independent chance of being included in the sample. In this technique selection is not haphazard but follows sound procedure to ensure chance. It is also free from sampling bias. It is more economic and scientific sampling method which ensures accuracy as compare to other methods. It is suitable for homogeneous population.

**Stratified Sampling:**

In this method of sampling the heterogeneous population is divided into distinct, non-overlapping and homogeneous subgroups called ‘strata’; based on any one of the criteria like income, profession, education or age and then random sample is selected from each group. Stratum is a subset of population that shares at least one common characteristic. Stratified Sample is obtained by independently selecting a separate simple random sample from each population stratum. Stratified sampling is commonly used method that is superior to random sampling because it reduces sampling error. This method is economical, theory of probability is used while selecting sample and suitable for skewed and heterogeneous sample.

**Systematic sampling:**

A systematic random sample is obtained by selecting one subject on random basis and choosing additional elementary subjects evenly spaced intervals until the desired number of subjects is obtained. It is also called an $n^{th}$ name selectin technique. In this method list of population subjects is arranged in particular order and every $k^{th}$ item is selected from population where $K$ sampling interval. $K$ is estimated dividing the size of population by the desired sample size. This method is easy to implement in practice. It is economical and representative sampling technique which does not involve human bias.

**Cluster sampling:**

In this method population is divided into heterogeneous groups called clusters. A cluster is then randomly selected from population and further complete enumeration of cluster is done. This divides the population into clusters at each stage and draws sample of required size at each stage. Sampling is done in multistage. Because the sampling is done at multi levels, this method is also called multistage sampling. Though it is an economical method of sampling but some time it is susceptible to sampling bias. Cluster sampling is useful in situation where the population members are naturally grouped in units that can be conveniently used as clusters like a village or a school.

**Non probability sampling methods:**
Non probability sampling methods are the methods in which probability is not estimated by any basis. These are also called uncontrolled sampling methods. These methods are technically inferior to probability sampling methods. Non probability method is used when researcher does not need to generalise the results.

**Convenience sampling:**

Convenience sampling involves the non-random selection of subjects based on their availability and convenient accessibility. In this sampling method any member of population can be included in the sample without any restriction and sample is drawn at the convenience of researcher. This sampling allows a large number of respondents to be selected in a short time. It is commonly used in early stage of research and not that much reliable. It is suitable for homogeneous population.

**Purposive sampling:**

When some restrictions are imposed on the possible inclusion of an element in the sample, the sampling is called purpose sampling. In purposive sampling researcher purposefully draw a sample from population which he/she thinks is a representative of population. It ensures low accuracy, reliability and personal bias. It is not suitable for homogeneous population.

**Quota sampling:**

Quota sampling is a sampling process where the sample is selected from pre specified quota by researcher based on demographic characteristics, specific attitude or specific behaviour. In this sampling the entire population divided into different categories and then decide the proportion of population falling into each category. From each category sample is selected according to researcher’s discretion. This sample is incapable of measuring true representativeness and ensures low accuracy. It is not suitable for homogeneous sample.

**Snowball sampling:**

Snowball sampling is defined as a technique for gathering research subjects through the identification of initial subjects who provide the names of other subjects. This method is possible when target population is very small and unique. This method is useful in qualitative research. It allows bias and no question of representativeness.
Tools of research:

Tool is anything used as a means of accomplishing a task or purpose. Tool can be enquirer, complier, interpreter, assembler, querer, reporter or processor. In research context simple meaning tool is nothing but the instrument that helps the researcher to collect data.

In any type of research it is essential to collect factual, unknown and untapped information/data. It can be obtained from many sources, direct or indirect. It is necessary for researcher to opt for systematic procedure to collect required and essential data. Researcher needs certain instruments to collect **relevant, sufficient, reliable, valid and adequate in quantity and quality data.** The instrument thus administered or employed for collecting data to explore, describe and conclude the research is called tool. Tools may vary in **complexity, interpretation, design and administration.** Selection of suitable tool or instrument is very important in successful research. Before selecting tool researcher has to select appropriate technique under which number of tools come. Technique is a systematic way, practical method, skill, or art applied to accomplish particular task. Research tools are broadly categorised under the techniques like Inquiry form, observation, sociometry and testing etc.

Questionnaire:

In educational researches after selecting research design and deciding who will be included in the study (population) the next step is to identify, select or develop suitable tool to answer research questions, to realise objectives and testing hypotheses in research. This is particularly used to reach out a large number of respondents in a short and stipulated time. Questionnaire is a tool to collect primary data. Primary data is collected for the first time. It is original and collected for a specific purpose to solve specific problems. It is list of questions related to one topic. It may be defined as;

"A questionnaire is a systematic compilation of questions that are submitted to a sampling of population from which information is desired." (Ban, Davis & Johnson)

"In general, the word questionnaire refers to a device for securing answers to questions by using a form which the respondent fills in himself." (W. J. Goode & K. Hall)

“The questionnaire is a set of stimuli to which illiterate people are exposed in order to observe their verbal behaviour under these stimuli” (George Lundberg)

“A questionnaire is a set of questions to a number of persons for them to answer. It secures standardised results that can be tabulated and treated statistically.”(Borgardus)

If the researcher has to collect variety of primary data about demographic or socioeconomic characteristics, attitudes, opinions, interests, awareness, knowledge, intentions, motivations and behaviour, questionnaire is one of the more focused and popular tools to collect primary data which permits range with minimum expense of money and efforts. Data collected through may be verbal, numeric, symbolic or pictorial. The questionnaire is send to the subject by hand, by E-mail, by post, by mobile apps or over the telephone.
A sample is a subset of people, items, or events from a larger population that you collect and analyze to make inferences. To represent the population well, a sample should be randomly collected and adequately large.

Quota sampling involves non-random selection of subject based on identification of specific characteristics to increase sample’s representativeness.