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Sampling and types of samples

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Abstract

Most of the educational phenomena contain large units. It is not possible to observe each unit of population under controlled conditions. Sometimes populations are so large that their study becomes time consuming. Sampling helps to reduce expenses, in terms of time, money effort and provide generalization on the basis of relatively small population. This paper discusses various types of samplings and their need in research process.

Keywords: educational phenomena, population

Introduction

Sampling is the act, process, or technique of selecting a suitable sample, or a representative part of a population for the purpose of determining parameters or characteristics of the whole population.

It is an important element of research. The quality of the research undertaken stands or falls depends upon the appropriateness of its methodology, instrumentation and suitable sampling strategy adopted.

Sampling terminology

Population

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 etc. It is also called as universe.

Sample frame

The collection of the elements from which samples are drawn is known as sample frame. It can be the same as population or a part of the population in some cases. It must be representative of the whole population.

Unit

Each component of the population being studied is known as a unit of the population.

Strata

The section of the population chosen by taking more or less homogenous units together is called a stratum and plural form is called strata.

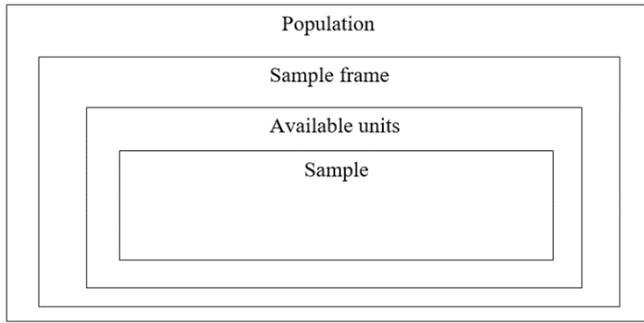
Sample

The items taken from the population for analysis (for deduction of hypothesis or arriving at a conclusion) is called as sample.

Sample size

The size of the total samples to be taken constitute the sample size. For a quantitative research the larger the sample the better and reliable the results are.

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Need of sampling in research methodology

Sampling is used in practice for a variety of reasons:

1. To bring the population to a manageable number.
2. To help in minimizing error from the despondence due to large number in the population.
3. To enable more accurate measurement for a sample study.
4. To reduce the cost.
5. To help the researcher to meeting the challenges of time.

Planning a sampling strategy

There are several stages in planning the sample (Cohen, Manion and Morrison, 2011).

Stage 1: Decide whether you need a sample or to have a whole population.

Stage 2: Identify the population, its important features (the sampling frame) and its size.

Stage 3: Identify the kind of sampling strategy.

Stage 4: Ensure that access to the sample is guaranteed unless modify sample strategy.

Stage 5: For probability sampling, identify the confidence level and for non-probability sampling, identify the people whom you require in the sample.

Stage 6: Calculates the numbers required in the sample, allowing for non-response, incomplete or spoiled responses etc.

Stage 7: Decision on how to gain manage access and content.

Stage 8: Be prepared to adjust the data, once collected.

Determining the sample size

The following general rules are helpful in determining the sample size (Gay, Mills and Airasian, 2014) [3].

1. The larger the population size, the smaller the percentage of the population required to get a representative sample.
2. For smaller population, say N = 100 or fewer there is little point in sampling, survey the entire population.
3. If the population size is around 500 (give or take 100), 50% should be sampled.
4. If the population size is around 1500, 20% should be sampled.
5. Beyond a certain point (about N = 5000) the population size is almost irrelevant and a sample size of 400 will be adequate.

Types of sampling methods

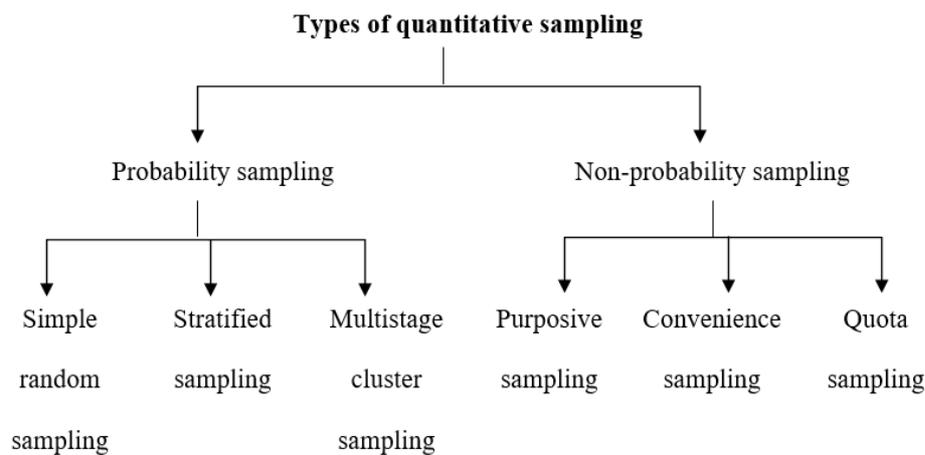
There are two main methods of sampling (Cohen and Holliday, 1996).Probability (random sample) and Non-Probability Sample (purposive sample). In the former sample every member of the wider population being selected for the sample are known, whereas in a non-probability sample the chances of members of the wider population being selected for the sample are unknown.

A. Sampling in quantitative research

In quantitative research the purpose of sampling is to gain information about a larger population.

1. Probability sampling

In probability sampling the researcher selects individuals from the population who are representative of that population. This is the most rigorous form of sampling in quantitative research because the investigator can claim that the sample is representative of the population and can make generalization to the population.



1.1 Simple random sampling

It is the process of selecting a sample in such a way that all individuals in the defined population have an equal and independent chance of selection for the sample. It is the best way to obtain representative sample. The selection is completely on a chance basis.

1.2 Stratified sampling

It is the process of strategically selecting a sample in such a way that guarantees desired representative of relevant subgroups within the sample. It is used to select proportional or equal sized samples from each of a number of subgroups.

1.3 Cluster sampling

It is a sampling in which groups not individuals are randomly selected. Clusters can be communities, states, schools, districts etc.

1.4 Systematic sampling

It is a sampling in which every k th individual is selected from a list of all the members in the population. K is a variable determined by dividing the number of individuals on the list by the number of subjects desired for the sample.

2. Non-probability sampling

The non-probability sampling methods are very convenient in the situations when the sample to be selected is very small and the researcher wants to get some idea of the population characteristics in a short time. These samples are used where representative samples are not required but to gain insight into the problem by selecting only informed persons who can provide comprehensive information about the problem undertaken. This sampling is not based on random selection.

2.1 Purposive sampling

In non-probability sampling, the units are selected at the discretion of the researcher. Such samples use human judgement in selecting units and have no theoretical basis for estimating population characteristics. The sample so collected is called purposive or judgement sampling.

2.2 Quota sampling

Suppose a researcher wants to study the attitude of teacher towards co-education at the secondary school stage. He may fix quota of 300 teachers and go on collecting data from first 300 teachers he is able to contact. The sample of 300 teachers thus selected is called quota or chunk sample.

2.3 Convenience sampling

If the quota is not fixed and the researcher collects information from all the teachers that are conveniently available and willing to co-operate for providing information the sample is called incidental or volunteer or convenient sample. Some other methods in this type of sample are dimensional sampling, snowball sampling, volunteer sampling, theoretical sampling.

Sampling Error and Bias

Sampling error is beyond the control of the researcher and occurs as a part of random selection procedures. Any type of bias on the part of researchers must be fully described in the final research report. Bias mainly occurs where there is use of non random sampling techniques. Generally four types of sampling and non-sampling errors have been classified by Mouly (1963, pp. 169-170).

a) **Unavoidable errors** - when sampling is done and some shift in the sample statistics can be caused by selecting at random.

b) **Bias in sampling** - Error which do not cancel out but which lean systematically in one or the other direction of the population value.

c) **Random errors of measurement** - These errors are due to the unreliability of the testing. These errors include errors

due to procedures of observation, interviewing, coding, non-response etc.

d) **Systematic errors of measurement** - It includes errors/discrepancies between the observation of the researcher and the quantities he aims to measure of the systematic non-cancelling type.

B. Sampling in Qualitative Research

Qualitative sampling is the process of selecting a small number of individuals for a study in such a way that the individuals chosen will be good key informants who will contribute the researcher's understanding of a given phenomenon. These studies can be carried out with a single participant or with as many as 60 or 70 participants. The sampling in qualitative research depends upon:

1. The extent to which the selected participants represent the range of potential participants in the setting.
2. The redundancy of the information gathered from the participants.

Approaches in Qualitative Sampling

1. Intensity sampling

In this type of sampling such participant should be selected who permit study of different levels of the research topic e.g. small and large classes, good and poor students etc.

2. Homogenous sampling

In this type of sampling such participants are selected who are very similar in experience, perspective or outlook. It makes data collection and analysis simple.

3. Criterion sampling

Here all such cases are selected that meet some set of criteria or have some characteristics.

4. Snowball sampling

In this type of sampling few people are selected who fit the researcher's needs and then those participants are used to identify additional participants and so on, until the researcher has sufficient number of participants.

5. Random purposive sampling

In this type of sampling more participant than needed for the study are selected. e.g. if a sample of 25 participants is selected then only 10 participants could take part in study. This type of strategy adds credibility to the study and is used with small samples.

Conclusion

All research involves the use of samples. The nature, size and method of selecting samples can vary with the research aim. Access to the sample is a key issue and must be decided early in the research. So, every element of the research should be planned and deliberate and not arbitrary. The selection of sample strategy must be governed by the criterion of suitability.

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