Sampling and its Types

**Tanaya Mohanty**

Assistant Professor

Dept. of Sociology, Utkal University

What is Sample?

- **A sample** is a subset of the population the researcher actually examines to gather the data.
- A sample is a subset of the population that represents the entire group.
- The collected data on the sample aims at gaining information on the entire population.
- **The population** is the entire group of subjects the researcher wants information on.
- **A sampling frame** consists of all units from which the sample will be drawn. Ideally, the sample frame should be identical to the population or at least closely resemble it

Concepts used in Sampling

- Sample is a subset of the population.
- Sampling Unit is a single member of the sample
- Sampling is a process of selecting an adequate number of elements from the population so that the study of the sample will not only help in understanding the characteristics of the population but will also generalize the results.
- Census is an examination of each and every element of the population.
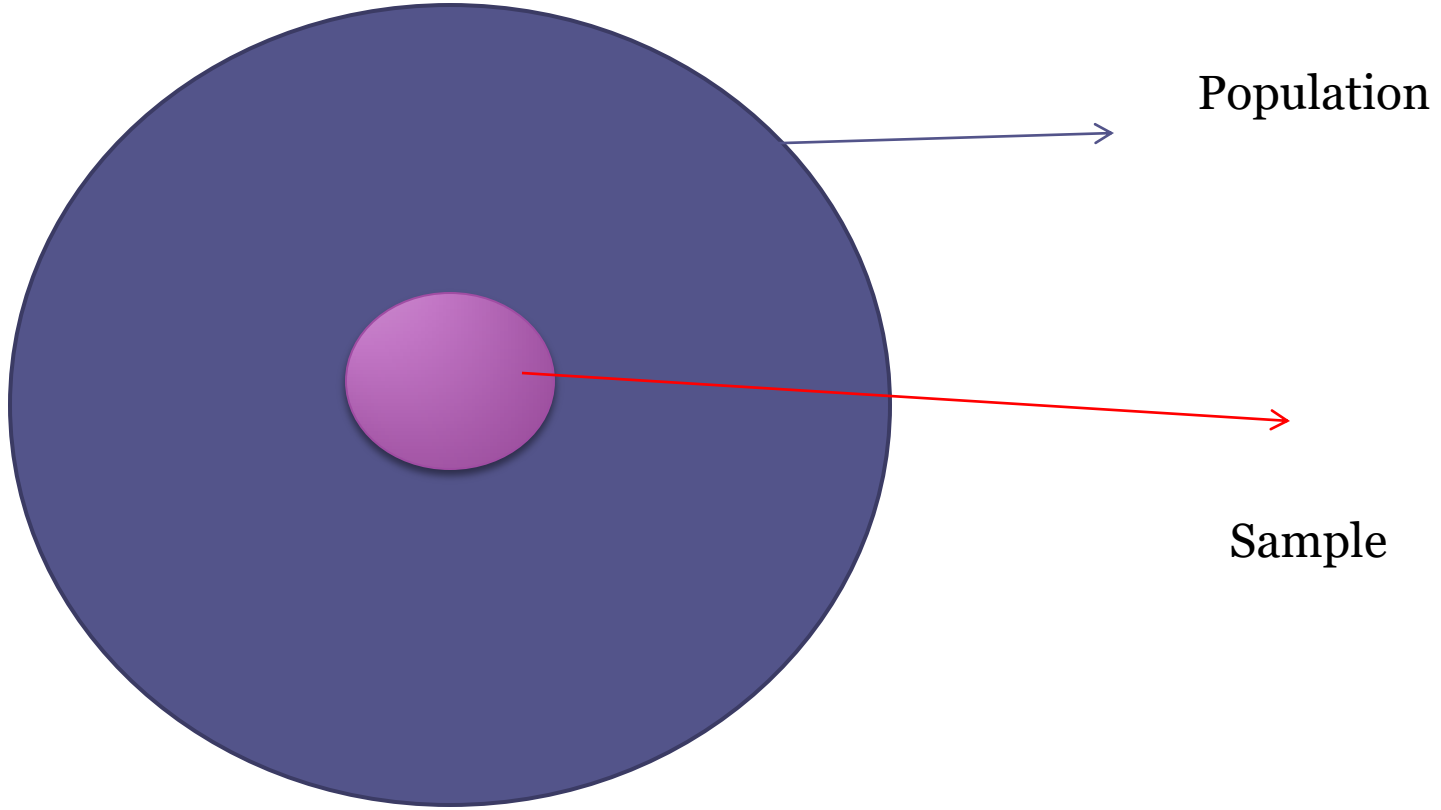
Population

Sample

Why Use Sampling?

- Necessity: In many cases a complete coverage of the population is not possible.
- Effectiveness: Complete coverage may not offer substantial advantage over a sample survey. Sampling provides better options in a short period of time as it produces comparable and valid results.
- Economy of time: Studies based on samples produce quick results in less time.

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- Economy of Labour: Sampling is less demanding in terms of labour requirements since it covers only a small portion of the target population.
- Overall Economy: Sampling is thought to be more economical as it involves fewer people and requires less printed material, fewer general costs in terms of travelling and accommodation and of course fewer experts.
- More detailed information: Samples are thought to offer more detailed information and a high degree of degree of accuracy because they deal with relatively small numbers of units.

Principles of Sampling

- Sample units must be chosen in a systematic and objective manner.
- Sample units must be easily identifiable and clearly defined.
- Sample units must be independent of each other, uniform and of same size and should appear only once in the population.
- Sample units are not interchangeable, same units should be used throughout the study.
- Once selected, units cannot be discarded.
- The selection process should be based on sound criteria and should avoid errors, bias and distortions.
- Researchers should adhere to the principles of research.

SAMPLING VS NON-SAMPLING ERROR

Two types of error may occur while we are trying estimate the population parameters from the sample.

- Sampling Error: arises when a sample is not representative of the population.

For example- We are trying to estimate the average height of students in the department of sociology, comprising of 200 students. We take a sample of 10 students. Lets assume that the true value of population mean is known. We may find that the sample mean is far away from the population mean. 'The difference between sample mean and population mean is called Sampling Error.

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- Non Sampling Error arises due to the following reasons:

i. When respondents do not the correct answer.
ii. Error can arise while transferring the data from the questionnaire to the spreadsheet.
iii. Errors can occur at the time of coding, tabulation and computation
iv. If the population of the study is not clearly defined.
v. The chosen respondents may not be available or choose not to be the part of the study.
vi. There may be sampling frame error.

Types of Sampling

- Probability Sampling
  - Here each member of the population has a equal probability of being selected.
  - The key point behind all probabilistic sampling approaches is random selection.
  - The advantage of probability sampling is that sampling error can be calculated.
- Non-probability Sampling
  - Here members are selected from the population in some non-random manner.
  - In this method, the degree to which the sample differs from the population remains unknown

Types of Probability Sampling

- Random Sampling
  - Here each unit of population has equal chance being selected.

Simple Random Sampling With Replacement:

- List of all elements of the population from where the samples to be drawn is prepared.
- If there are 1000 elements in the population, all those 1000 elements are put on different slips.
- If we choose to take a sample of 20 elements, we pick up one unit from the box, note it down and again it in the box.
- The first element is chosen with a probability of 1/1000, and the second element has the same probability.

Simple Random Sampling Without Replacement:

- Here the procedure is same as followed in the previous design but the only difference is that the chosen slip is not placed back in the box. This way the first unit would be selected with a probability of 1/1000, second unit will have a probability of 1/999 and so on.

Simple Random (With or Without Replacement) is not used in a consumer research as it is difficult to prepare a sampling frame.

It can not be used may not provide a representative sample in every case. For example, A locality has 10000 households with 5000 from low income group, 3500 from middle and the remaining 1500 from high income group. It may turn out to be a non-representative sample as each section may not get represented using this design.

Systematic Sampling

- Here the entire population is arranged in an order, either in ascending, descending or alphabetical order.
- First, Sampling Interval is given by K=N/n (N=Size of the population; n=size of the sample)
- A random number is selected from 1 to K. Let us call it C.
- The first element to be selected from the ordered population would be C.
- The next element would be C+K, then C+2K and so on till the sample size n is selected.

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- This can be representative as it would contain representations from every category.
- It may be noted that the first unit is selected at random (probability sampling design) and having chosen this, we have no control over the subsequent units of sample (non-probability). This design is also called mixed sampling.
- It is statistically more efficient than simple random sampling.
- Duplication is not a problem in this design.
- It may not require a complete sampling frame always. For example, an investigator may interview every 10th customer entering a mall.
- At times, there is a chance of systematic bias creeping into the sample resulting in non-representative sample.

- Stratified sampling
  - ▫ A stratum is a subset of the population that shares at least one common characteristic. Examples of strata might be males and females, or managers and non-managers

STRATIFIED RANDOM SAMPLING
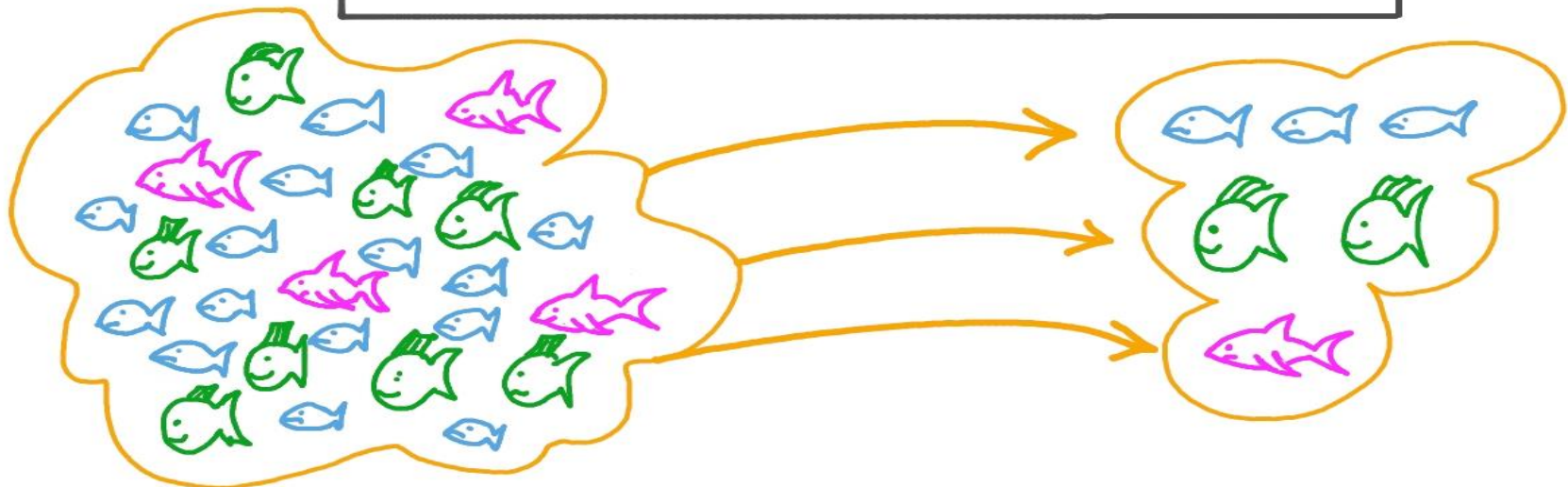
Stratified Random Sampling

- Here the entire population is divided into strata (groups), which are mutually exclusive and collectively exhaustive.
- The elements are selected using simple random sampling independently from each group.
- It is more efficient as compared to simple random sampling as dividing the population into strata increases the representativeness of the sampling.

a. Proportionate allocation
b. Disproportionate allocation

Cluster random sampling

▫ It is useful when the population is dispersed across a wide geographic region. This method allows one to divide the population into clusters and then select the clusters at random.
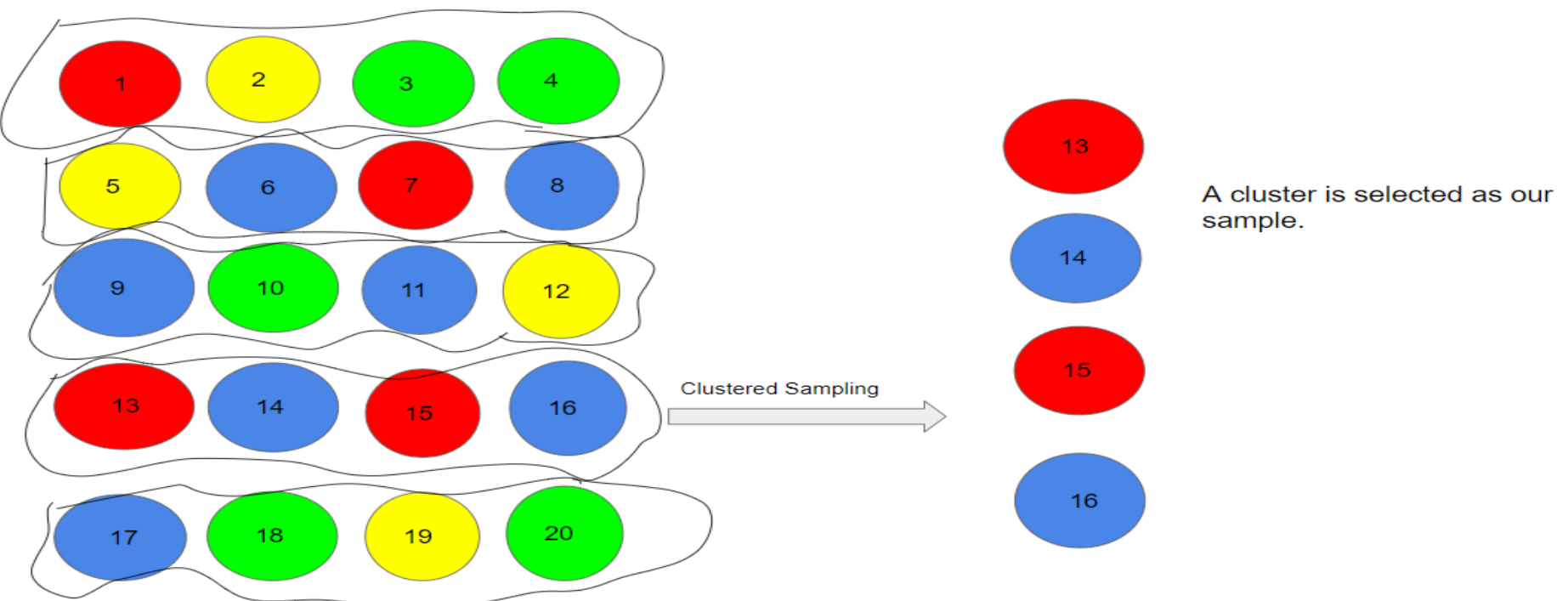
Population divided into clusters

Clustered Sampling

A cluster is selected as our sample.

Cluster Sampling

- In cluster sampling, the entire population is divided into various clusters in such a way that the elements within the cluster are heterogeneous.
- However, there is homogeneity between the clusters.
- It is considered to be the opposite of stratified sampling design.
- Cluster sampling is useful when populations under a survey is widely dispersed and drawing simple random sample may not be practical.
- Sometimes, the applicability of cluster sampling in the organizational context be questioned.

Types of Non-probability sampling

- Convenience sampling
    - It is used in exploratory research where the investigator is interested in getting an inexpensive approximation of the fact. As the name implies, the sample is selected because it is convenient. Also called haphazard or accidental sampling
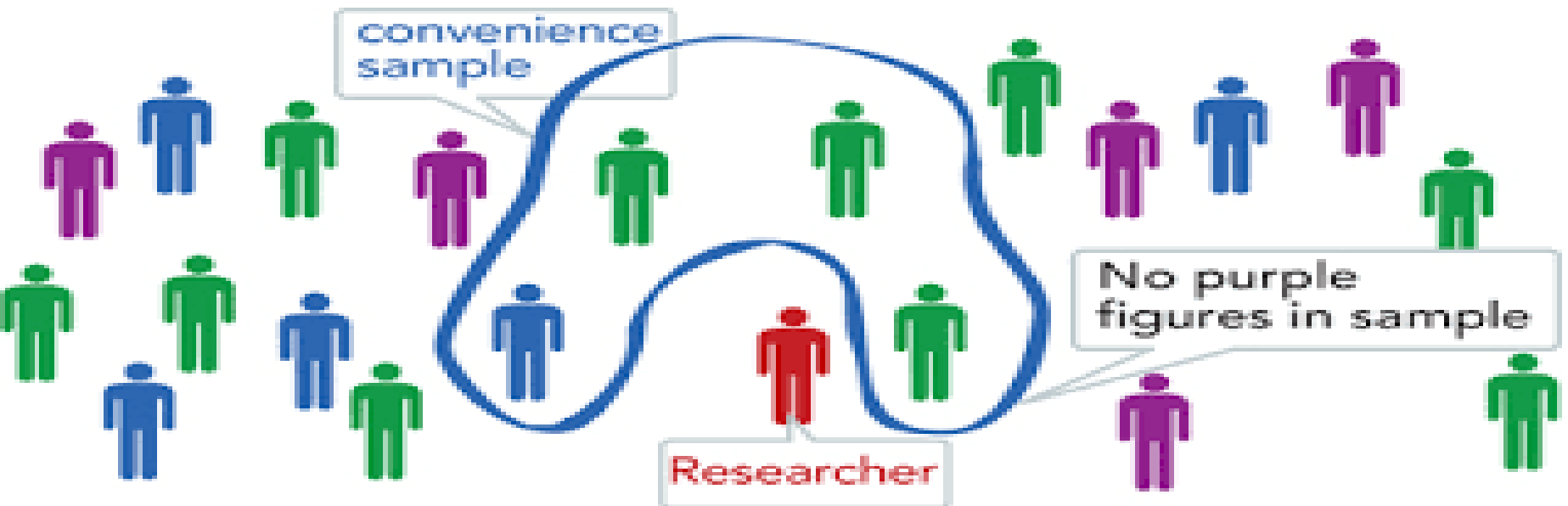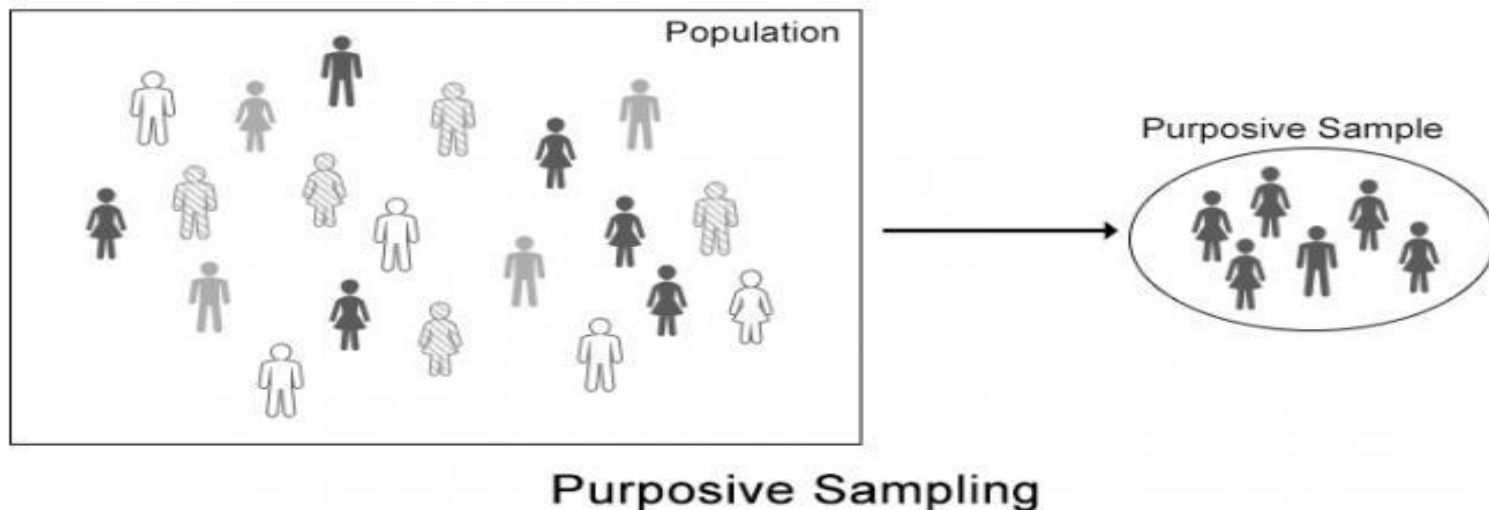
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Convenience Sampling
- It is used to obtain information quickly and inexpensively.
- It is used in the pre-test phase of a research such as pre-testing the questionnaire.
- Here sampling unit may either be self selected or selected because of ease of availability.
- No effort is made to choose representative sample.
- It is not possible to make an estimate of sampling error in this case so not suitable for descriptive and causal research.
- Generally used in exploratory research.

- Judgment sampling
  - The researcher selects the sample based on judgment. This is usually an extension of convenience sampling.
  - the researcher targets a group of people believed to be typical or average, or a group specially picked for some unique purpose.


Purposive Sampling

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- In this case, judgement of an expert is used to identify a representative sample.
- It is used when the required information is possessed by limited number of people.
- Generalization may not be possible but this is helpful when one needs to the insights of opinion leaders and experts in a given field.

- Snowball Sampling
  - This method used when the desired sample characteristic is rare. It may be extremely difficult or cost prohibitive to locate respondents in these situations.
  - Snowball sampling relies on referrals from initial subjects to generate additional subjects

Snowball sampling
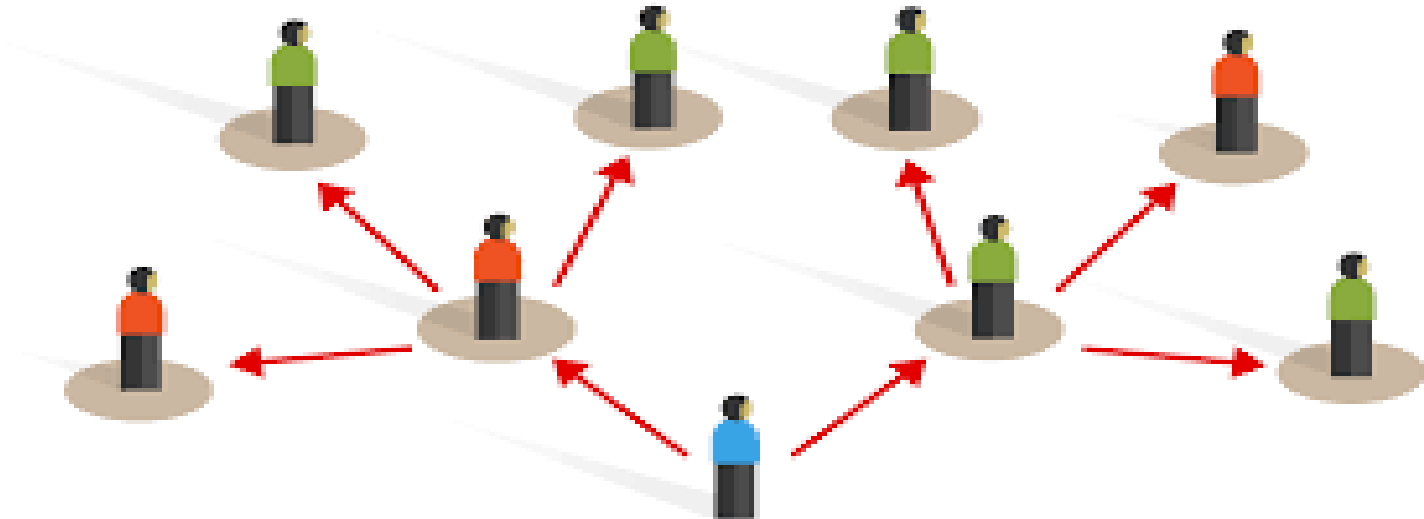
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- Snowball sampling is generally used when it is difficult to identify the members of the desired population.
- Under this design each respondent after being interviewed is asked to identify one or more in the field.

- Quota sampling
  - It is the non-probability equivalent of stratified sampling. Like stratified sampling, the researcher first identifies the strata and their proportions in the population. Then convenience or judgment sampling is used to select the required number of subjects from each stratum

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- Quota Sampling comprises a minimum number of specified sub-group in the population. The same is selected on the basis of certain demographic characteristics such as age, gender, occupation, education.
- Here the investigators may choose from each category conveniently.
- Quota Sampling does not require a sampling frame.
- It may appear similar to stratified random sampling design but here it is selected at random while Quota Sampling is chosen with convenience.
- The former can be generalized while the later cannot be.

Suggested Readings

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Thank you