M.A. Semester I

CC-4 Research Methodology and Statistics

Unit III Sample and Sampling Techniques

(b) (a) Sample – Meaning, characteristics of a good/scientific sample

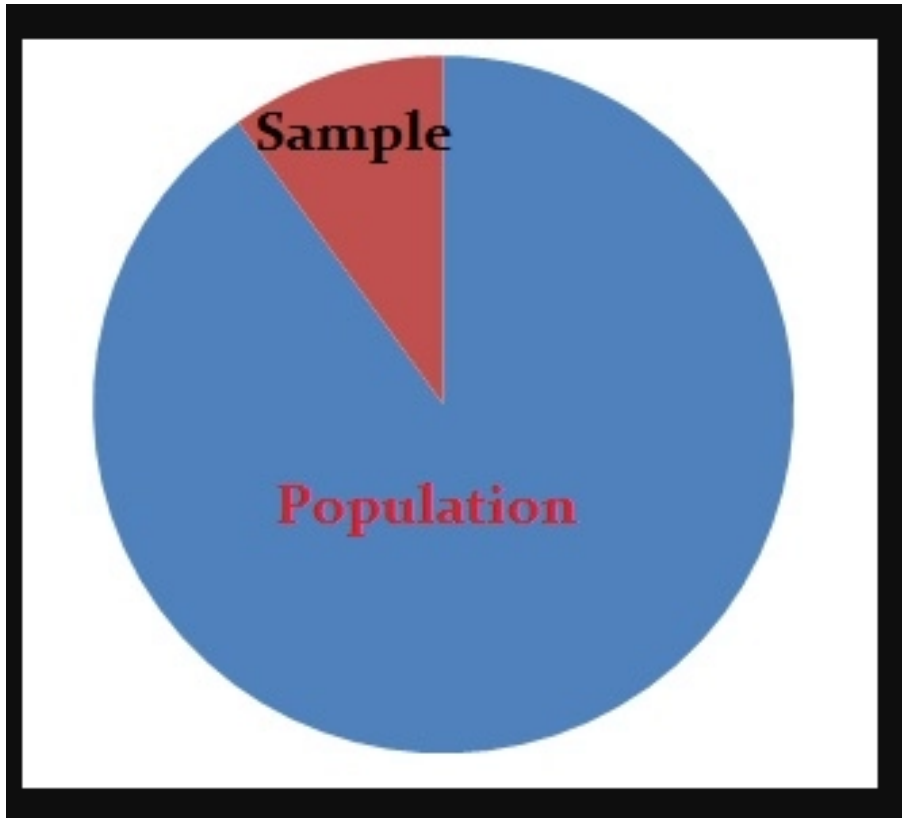
(b) Sampling techniques – Probability sampling - meaning and types

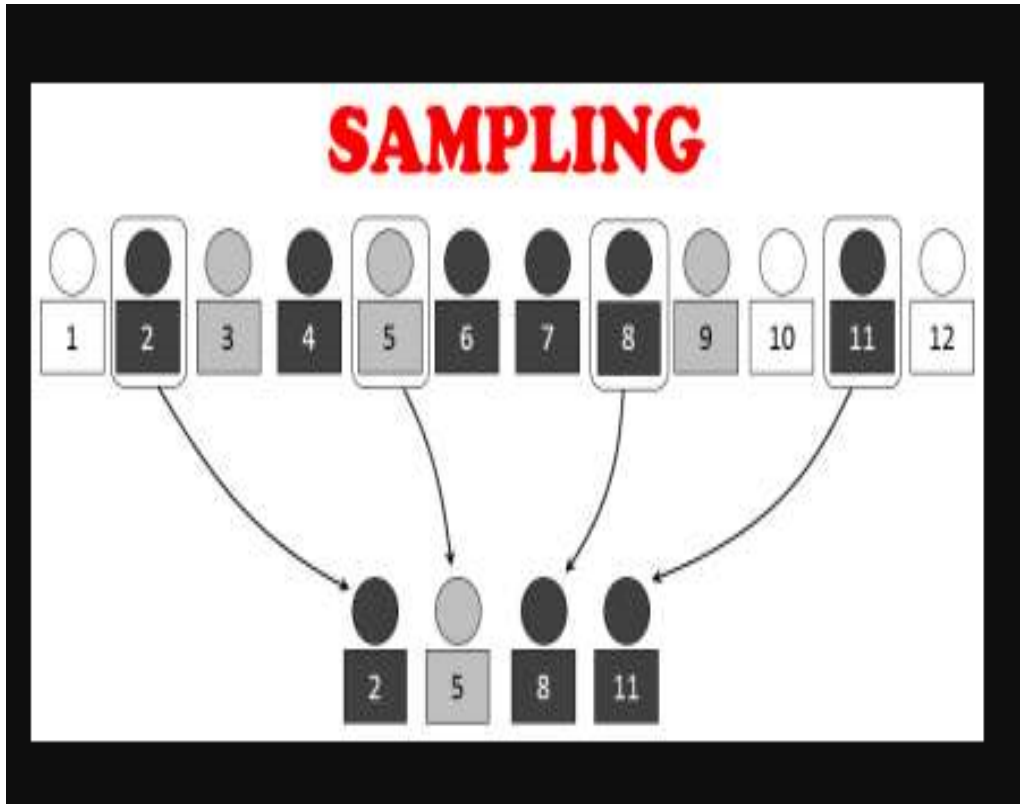
Non-probability sampling - meaning and types

Prof. (Dr) Anju Srivastava
Department of Home Science
Patna University
srivastava.anju@yahoo.com
9334121405

Unit III (b)

Sampling techniques – Probability sampling - meaning and types
Non-probability sampling - meaning and types





Sampling

- **The process of deriving a sample is called a sampling method**
- **Sampling forms an integral part of research design as this method derives quantitative and qualitative data that can be collected as part of a research study**
- **Sampling is a process used in statistical analysis in which a predetermined number of observations are taken from a larger population**
- **Sampling is a technique of selecting individual members or a sub-set of the population to make statistical inferences from them and estimate characteristics of the whole population**
- **Sampling may be defined as the procedure in which a sample is selected from an individual or a group of people of certain kind for research purpose. In sampling, the population is divided into a number of parts called sampling units**
- **Sampling is the statistical process of selecting a sub-set (called a "sample") of a population of interest for purposes of making observations and statistical inferences about that population. Social science research is generally about inferring patterns of behaviors within specific populations**
- **Sampling methods are characterized into two distinct approaches: probability sampling and non-probability sampling**

4. **Sufficient data accuracy**

Having drawn a sample and computed the desired descriptive statistics, it is possible to determine the stability of the obtained sample value. A sample represents the population from which it is drawn. It permits a high degree of accuracy due to a limited area of operations. Moreover, careful execution of field work is possible. Ultimately, the results of sampling studies turn out to be sufficiently accurate.

5. **Organization of convenience**

Organizational problems involved in sampling are very few. Since sample is of a small size, vast facilities are not required. Sampling is therefore economical in respect of resources. Study of samples involves less space and equipment.

Advantages of Sampling

1. **Low cost**

   If data is to be collected for the entire population, the cost will be quite high. A sample is a small proportion of a population. So, the cost will be lower if data is collected for a sample of population which is a big advantage.

2. **Less time consuming**

   Use of sampling takes less time. It consumes less time than census technique. Tabulation, analysis etc., take much less time in the case of a sample than in the case of a population.

3. **High Scope**

   - **The investigator is concerned with the generalization of data. To study the whole population in order to arrive at generalizations would be impractical.**
   - **Some populations are so large that their characteristics cannot be measured. Before the measurement has been completed, the population would have changed. But the process of sampling makes it possible to arrive at generalizations by studying the variables within a relatively small proportion of the population.**

6. **Intensive and exhaustive data**

   In sample studies, measurements or observations are made of a limited number. So, intensive and exhaustive data are collected.

7. **Suitable for limited resources**

   The resources available within an organization may be limited so studying the entire universe is not viable. The population can be satisfactorily covered through sampling. Where limited resources exist, use of sampling is an appropriate strategy while conducting research.

8. **Better rapport**

   An effective research study requires a good rapport between the researcher and the respondents. When the population of the study is large, the problem of rapport arises. But manageable samples permit the researcher to establish adequate rapport with the respondents.

Disadvantages of sampling

1. **Chances of bias**

   A serious limitation of the sampling method is that it involves biased selection and thereby leads us to draw erroneous conclusions. Bias arises when the method of selection of sample employed is faulty. Relatively small samples properly selected may be much more reliable than large samples poorly selected.

2. **Difficulties in selecting a truly representative sample**

   Representative sample produces reliable and accurate results only when they are representative of the whole group. Selection of a truly representative sample is difficult when the phenomena under study are of a complex nature. Selecting good sample is difficult.

3. **Inadequate knowledge in the subject**

   Use of sampling method requires adequate subject specific knowledge in sampling technique. Sampling involves statistical analysis and calculation of probable error. When researchers lack specialized knowledge in sampling, they may commit serious mistakes. Consequently, the results of the study will be misleading.

4. Changeability of units

When the units of the population are not homogeneous, the sampling technique will be unscientific. In sampling, though the number of cases is small it is not always easy to stick to the selected cases. The units of sample may be widely dispersed.

Some of the cases of sample may not cooperate with the researcher and some others may be inaccessible. Because of these problems, all the cases may not be taken up. The selected cases may have to be replaced by other cases. Changeability of units stands in the way of results of the study.

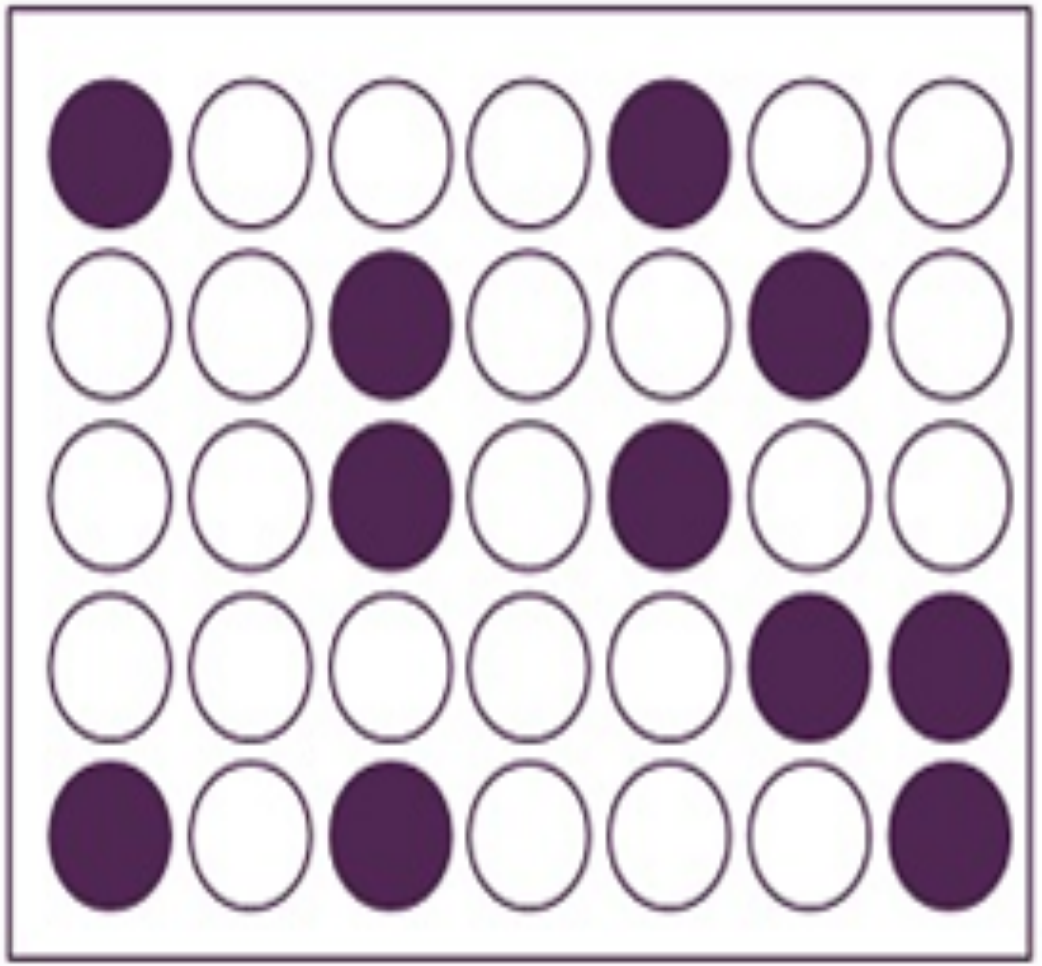
5. Impossibility of sampling

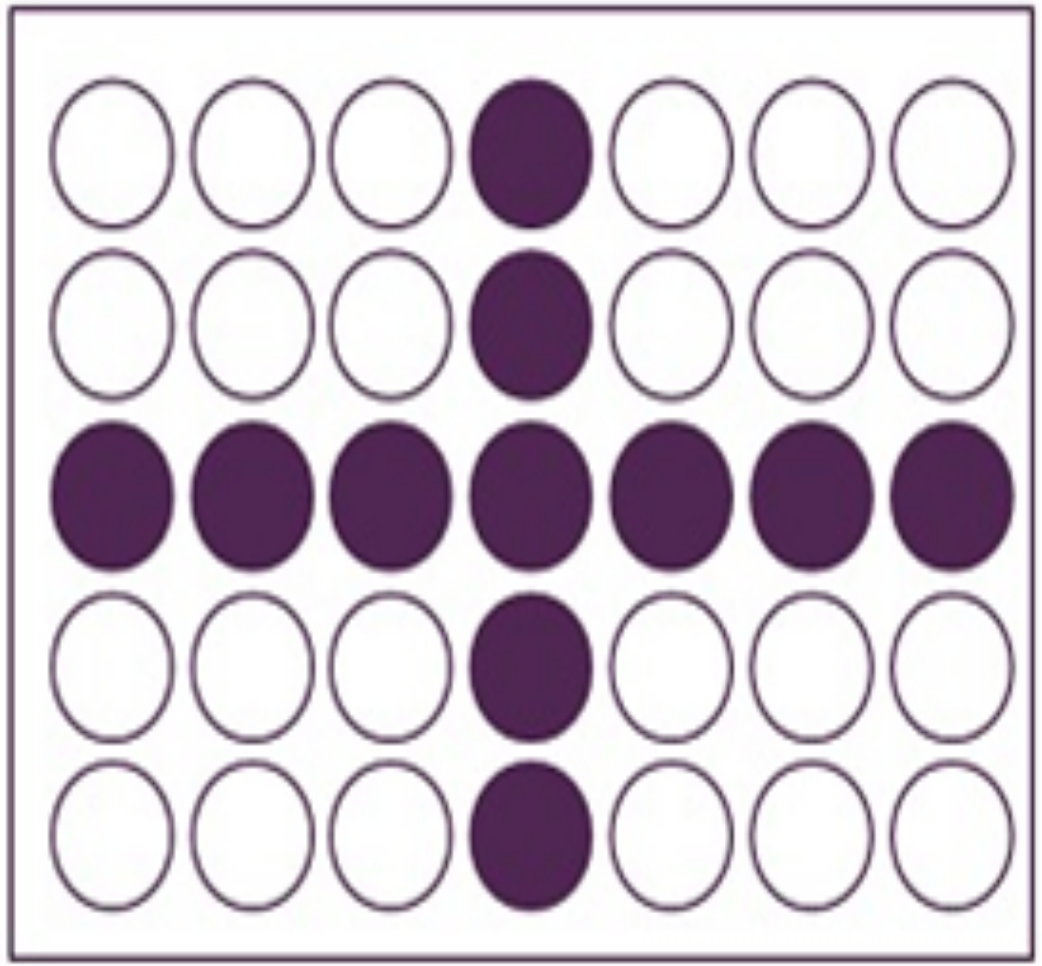
Deriving a representative sample is difficult when the universe is too small or too heterogeneous. In this case, census study is the only alternative. Moreover, in studies requiring a very high standard of accuracy, sampling method may be unsuitable. There will be chances of errors even if samples are drawn most carefully.

Types of Sampling Techniques

Sampling in research is of two types – probability sampling and non-probability sampling

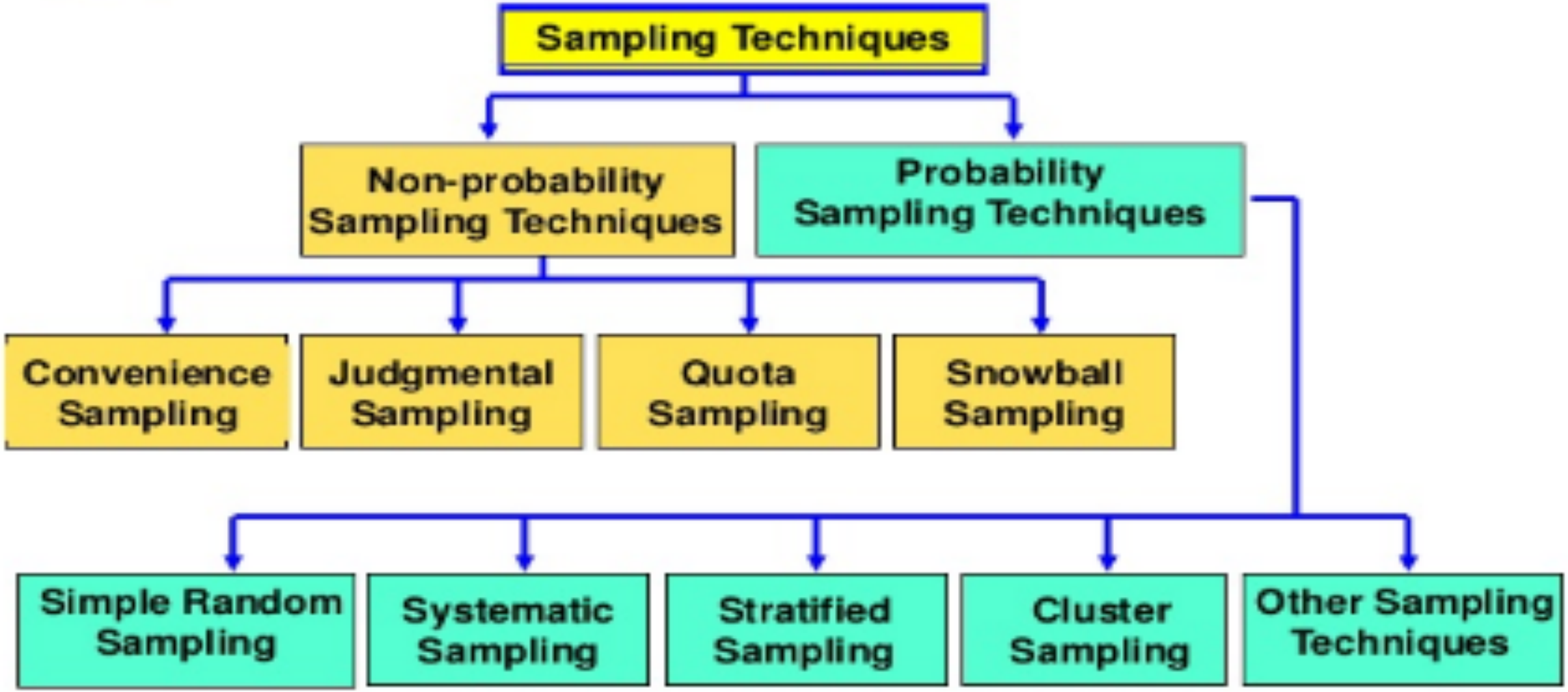
- **Probability sampling is a sampling technique where a researcher sets a selection criteria and chooses members of a population randomly. All the members have an equal opportunity to be a part of the sample with this selection parameter.**
- **In non-probability sampling, the researcher chooses members for research at random. This sampling technique does not have a fixed or predefined selection process. This makes it difficult for all elements of a population to have equal opportunities to be included in a sample.**

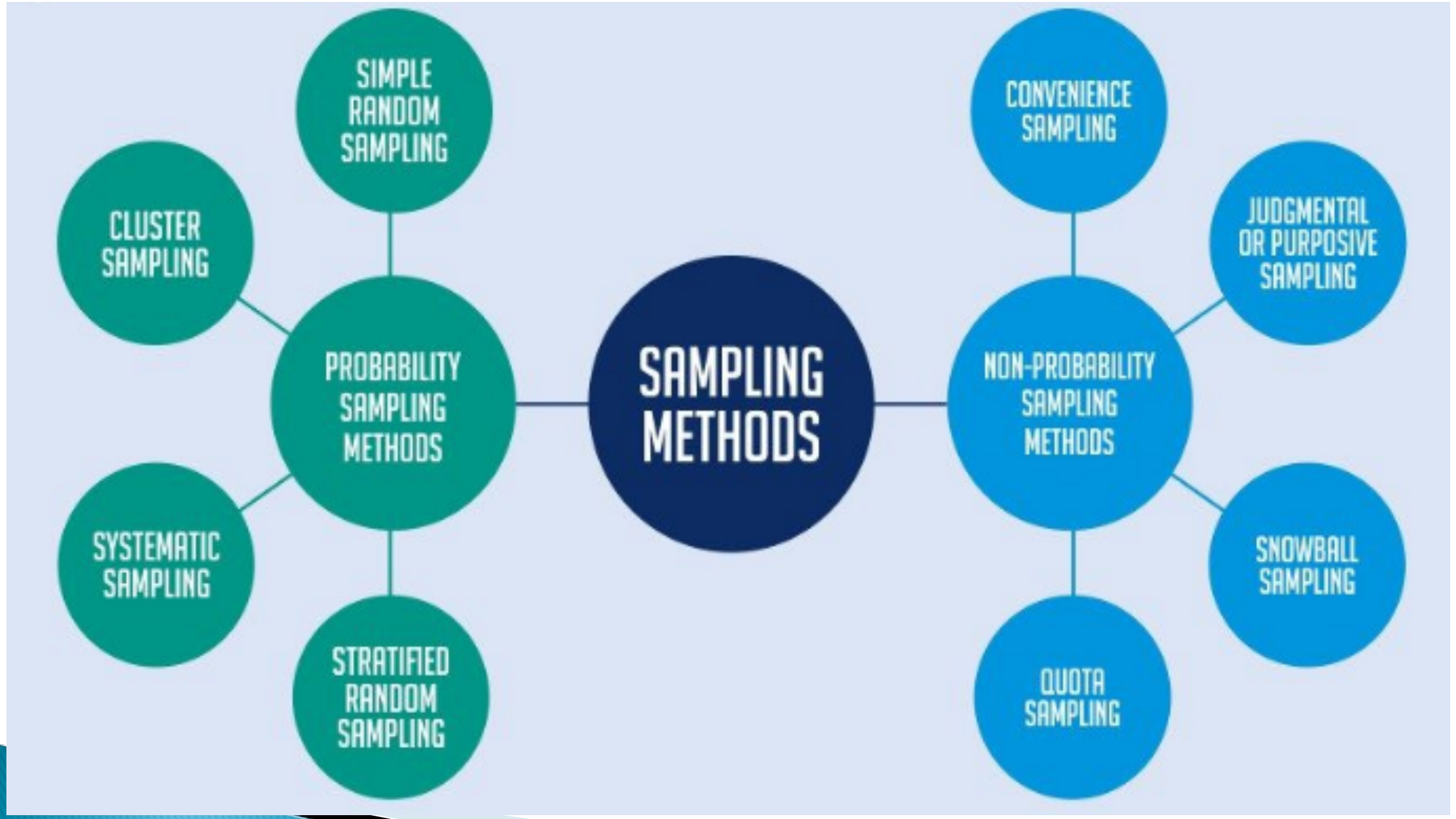




Probability Sampling Vs Non-Probability Sampling

Classification of Sampling Techniques




SAMPLING METHODS
PROBABILITY SAMPLING METHODS
SIMPLE RANDOM SAMPLING
CLUSTER SAMPLING
SYSTEMATIC SAMPLING
STRATIFIED RANDOM SAMPLING
NON-PROBABILITY SAMPLING METHODS
CONVENIENCE SAMPLING
JUDGMENTAL OR PURPOSIVE SAMPLING
SNOWBALL SAMPLING
QUOTA SAMPLING

Sampling Methods

Sample can be selected through different methods. Blalock (1960) classified the sampling methods into two categories on the basis of the nature of selection of the sample units.

I) Non- Probability Sampling (Non-Random sampling techniques)

II) Probability Sampling (Random sampling techniques)

I) Non- Probability Sampling (Non-Random sampling techniques)

In a non-probability sample, individuals are selected based on non-random criteria, and not every individual has a chance of being included.

This type of sample is easier and cheaper to access, but it has a higher risk of sampling bias. That means the inferences you can make about the population are weaker compared to probability samples and your conclusions may be more limited. If you use a non-probability sample, you should still aim to make it as representative of the population as possible.

Non-probability sampling techniques are often used in exploratory and qualitative research. In these types of research, the aim is not to test a hypothesis about a broad population, but to develop an initial understanding of a small or under-researched population. There are four main types of probability sample:

1. ***Convenience sampling***
2. ***Purposive / judgmental sampling***
3. ***Quota sampling***
4. ***Referral / Snowball sampling***

Non- probability Sampling Techniques

1. Convenience sampling

A convenience sample simply includes the individuals who happen to be most accessible to the researcher. This method is used when the availability of sample is rare and also costly. So samples are selected based on the convenience .

This is an easy and inexpensive way to gather initial data but there is no way to tell if the sample is representative of the population, so it can't produce generalized results. Researchers prefer this during the initial stages of survey research as it's quick and easy to deliver results.

Example –

You are researching opinions about student support services in your university, so after each of your classes, you ask your fellow students to complete a survey on the topic. This is a convenient way to gather data, but as you only surveyed students taking the same classes as you at the same level, the sample is not representative of all the students at your university.

2. Purposive / judgmental sampling

Purposive sampling is also known as judgmental, selective or subjective sampling. This is based on the intention or the purpose of study. Only those elements will be selected from the population which best suits the purpose of the study.

This type of sampling involves the researchers using their expertise to select a sample that is most useful to the purposes of the research.

It is often used in qualitative research where the researcher wants to gain detailed knowledge about a specific phenomenon rather than make statistical inferences, or where the population is very small and specific. An effective purposive sample must have clear criteria and rationale for inclusion.

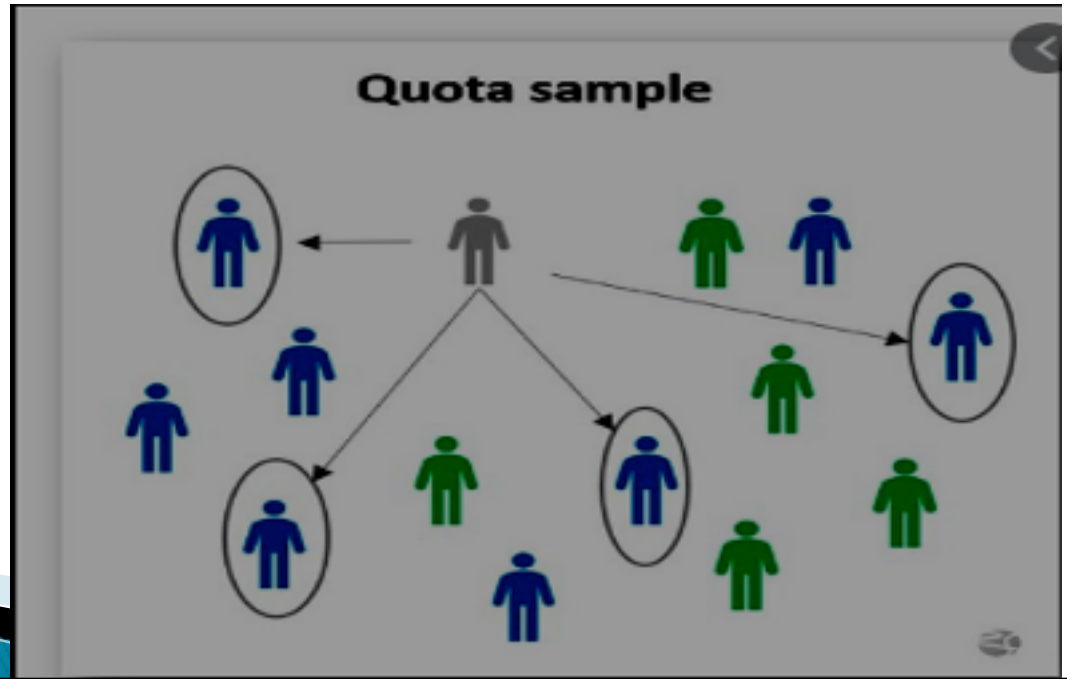
Example –

You want to know more about the opinions and experiences of disabled students at your university, so you purposefully select a number of students with different support needs in order to gather a varied range of data on their experiences with student services.

3. Quota sampling

In quota sampling, a population is first segmented into mutually exclusive sub-groups, just as in stratified sampling. Then judgment is used to select the subjects or units from each segment based on a specified proportion.

Example, an interviewer may be told to sample 200 females and 300 males between the age of 45 and 60. This means that individuals can put a demand on who they want to sample (targeting).

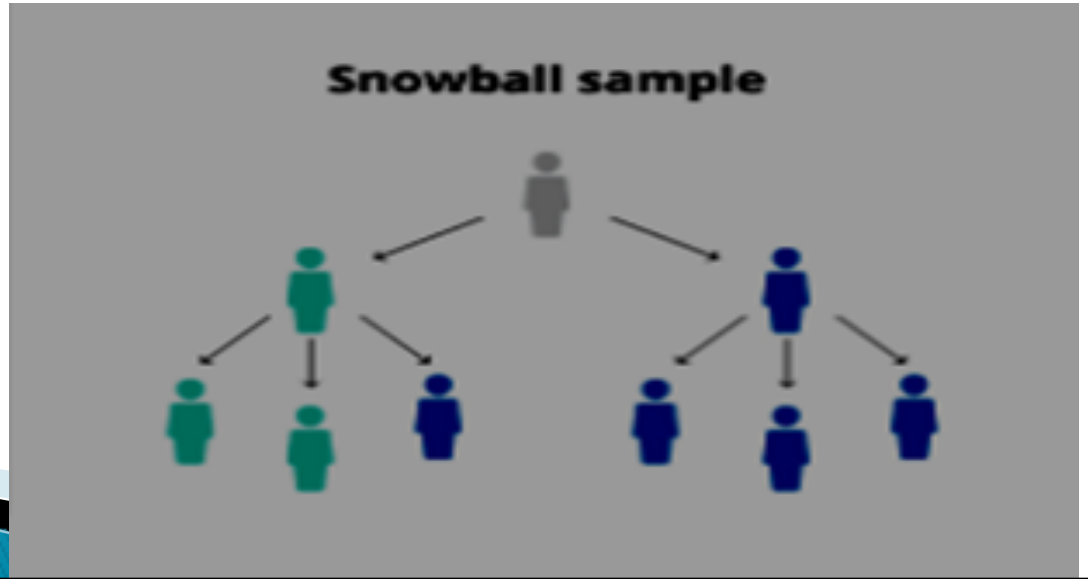


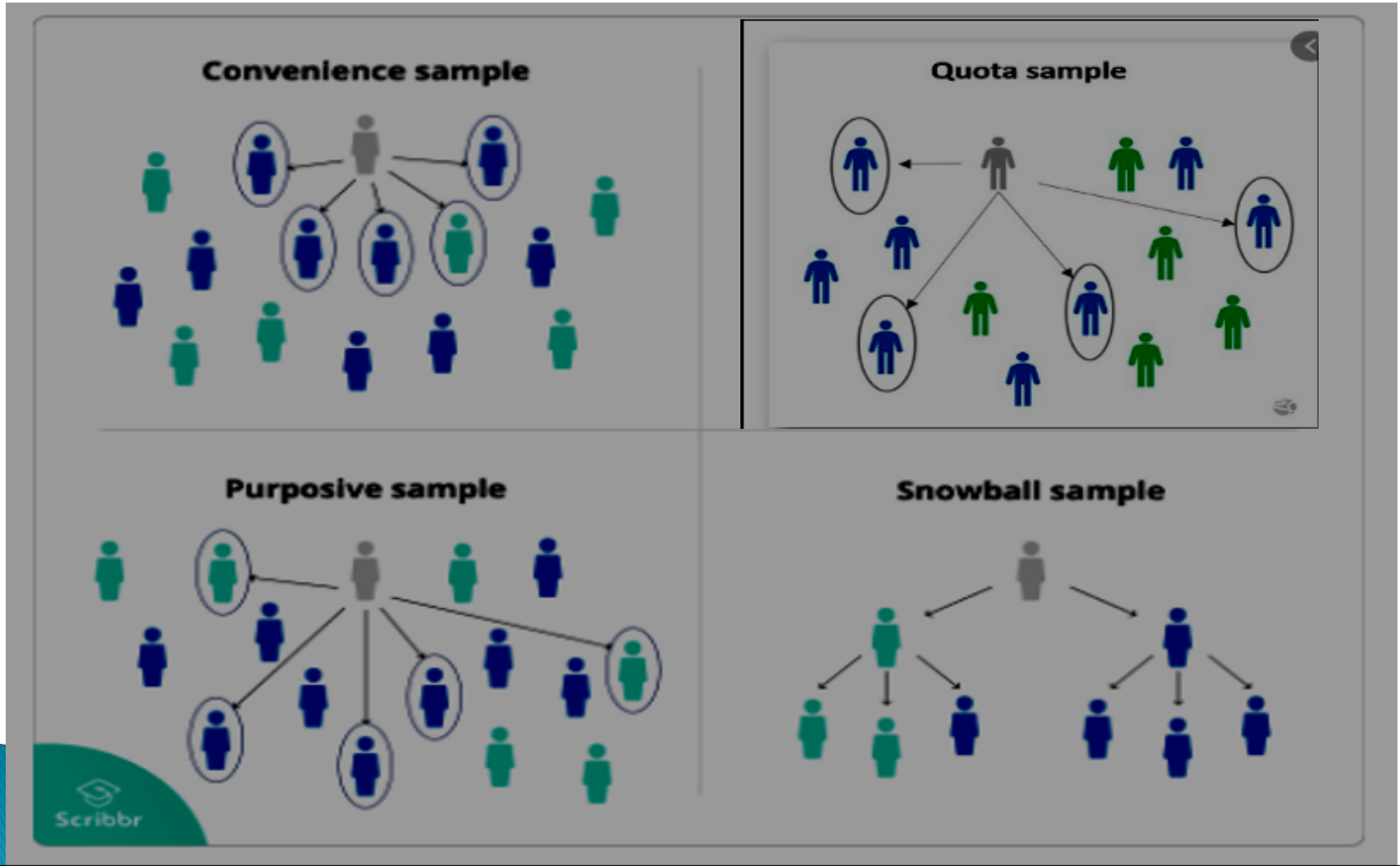
4. Referral/Snowball sampling

This technique is used in the situations where the population is completely unknown and rare. If the population is hard to access, snowball sampling can be used to recruit participants via other participants. The number of people you have access to "snowballs" as you get in contact with more people. So this referral technique goes on, increasing the size of population like a snowball.

Example

You are researching experiences of homelessness in your city. Since there is no list of all homeless people in the city, probability sampling isn't possible. You meet one person who agrees to participate in the research, and she puts you in contact with other homeless people that she knows in the area.




Convenience sample
Quota sample
Purposive sample
Snowball sample
Scribbr

Probability Sampling Techniques

II) Probability Sampling (Random sampling techniques)

Probability sampling means that every member of the population has a chance of being selected. It is mainly used in quantitative research. If you want to produce results that are representative of the whole population, probability sampling techniques are the most valid choice.

There are four main types of probability sample:

1. **Simple random sampling**
2. **Stratified sampling**
3. **Systematic sampling**
4. **Cluster sampling**

Probability Sampling Techniques

1. Simple random sampling

In a simple random sample, every member of the population has an equal chance of being selected. Your sampling frame should include the whole population.

To conduct this type of sampling, you can use tools like random number generators or other techniques that are based entirely on chance.

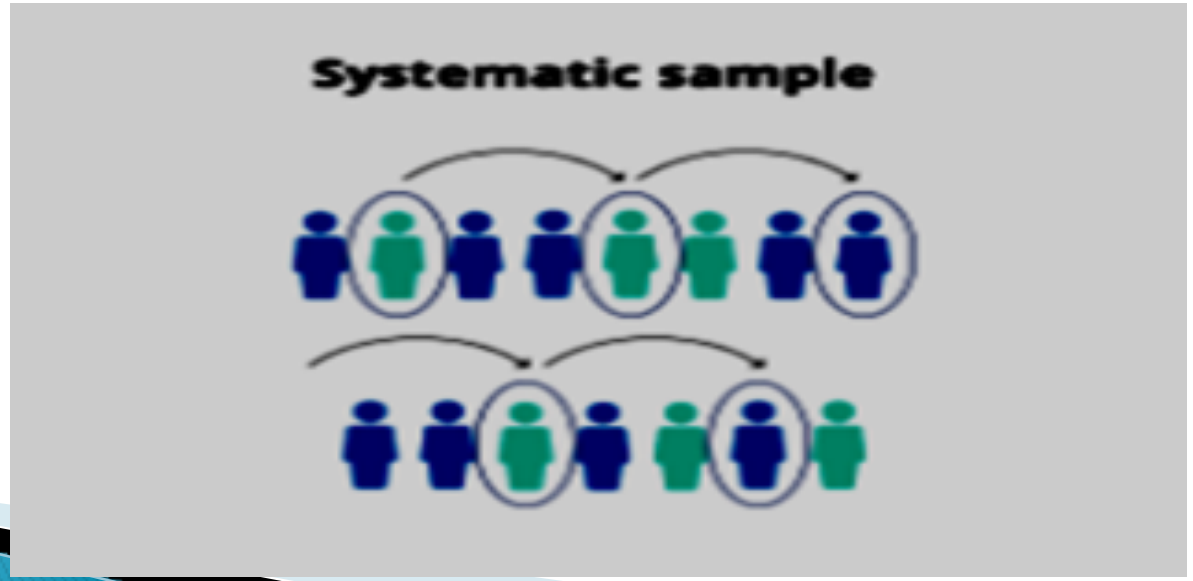
***Example* - You want to select a simple random sample of 100 employees of Company X. You assign a number to every employee in the company database from 1 to 1000, and use a random number generator to select 100 numbers.**

2. Systematic sampling

Systematic sampling is similar to simple random sampling, but it is usually slightly easier to conduct. Every member of the population is listed with a number, but instead of randomly generating numbers, individuals are chosen at regular intervals. Here the selection of elements is systematic and not random except the first element. Elements of a sample are chosen at regular intervals of population.

Example –

All employees of the company are listed in alphabetical order. From the first 10 numbers, you randomly select a starting point: number 6. From number 6 onwards, every 10th person on the list is selected (6, 16, 26, 36, and so on), and you end up with a sample of 100 people.



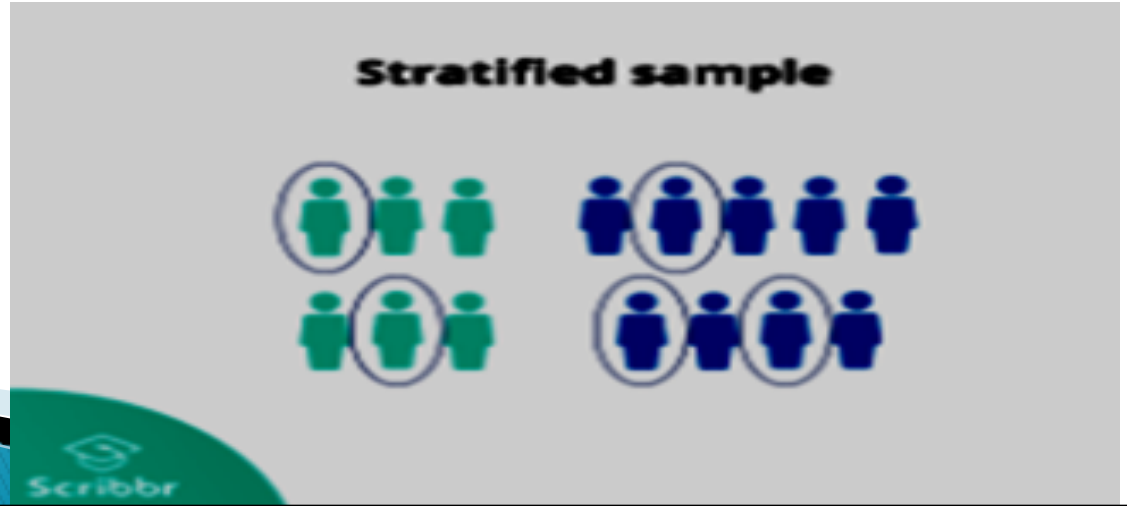
3. Stratified sampling

Stratified sampling involves dividing the population into sub-populations that may differ in important ways. It allows you to draw more precise conclusions by ensuring that every subgroup is properly represented in the sample.

To use this sampling method, you divide the population into subgroups (called strata) based on the relevant characteristic (e.g. gender, age range, income bracket, job role etc). Based on the overall proportions of the population, you calculate how many people should be sampled from each subgroup. Then you use random or systematic sampling to select a sample from each subgroup.

Example –

The company has 800 female employees and 200 male employees. You want to ensure that the sample reflects the gender balance of the company, so you sort the population into two strata based on gender. Then you use random sampling on each group, selecting 80 women and 20 men, which gives you a representative sample of 100 people.



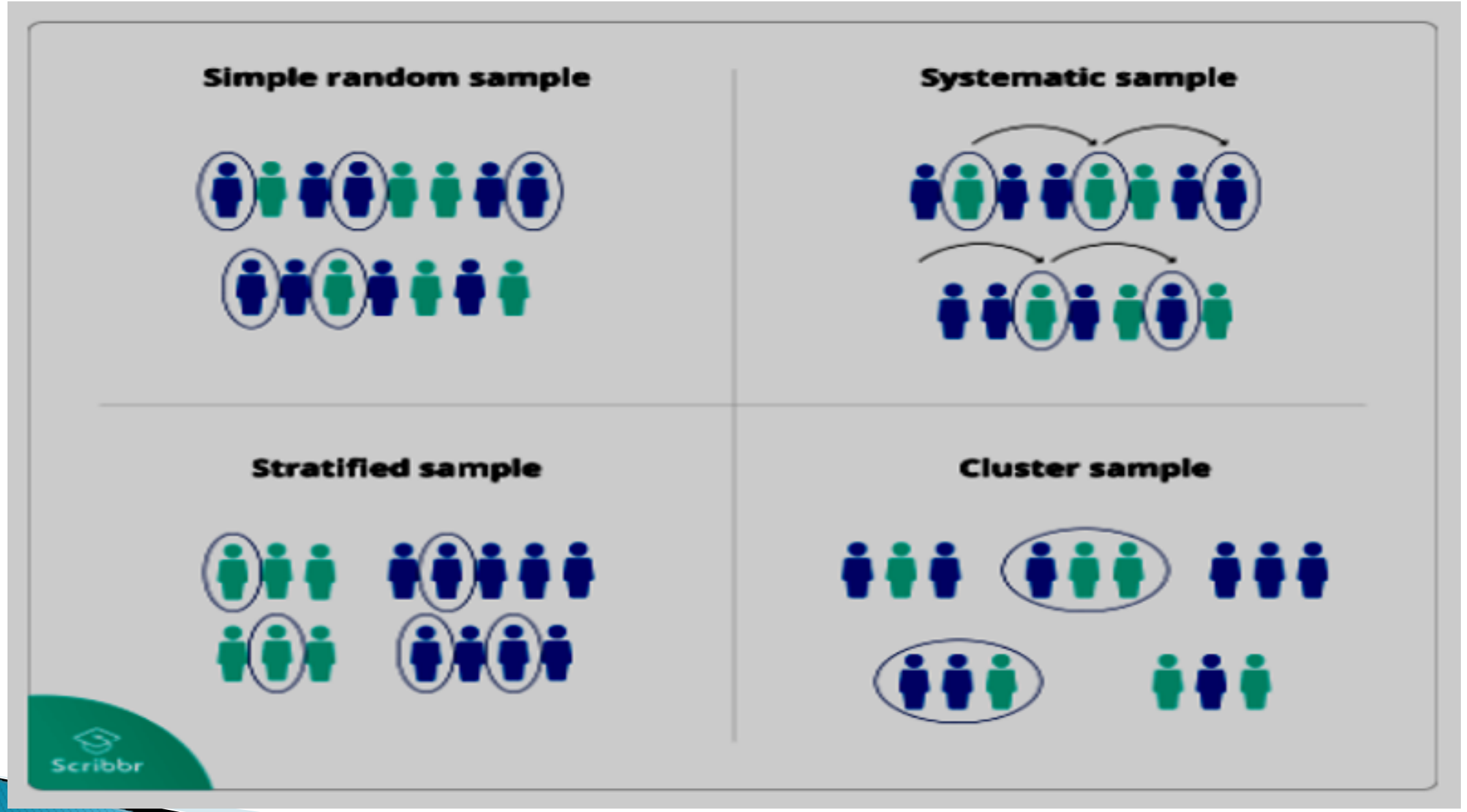
4. Cluster sampling

Cluster sampling also involves dividing the population into subgroups but each subgroup should have similar characteristics to the whole sample. Instead of sampling individuals from each subgroup, you randomly select entire subgroups.

If it is practically possible that you might include every individual from each sampled cluster. If the clusters themselves are large, you can also sample individuals from within each cluster using one of the techniques earlier. Clusters are identified using details such as age, sex, location etc.

Example –

The company has offices in 10 cities across the country (all with roughly the same number of employees in similar roles). You don't have the capacity to travel to every office to collect your data, so you use random sampling to select 3 offices – these are your clusters.


Simple random sample
Systematic sample
Stratified sample
Cluster sample
Scribbr

Difference between probability sampling and non-probability sampling methods

	Probability Sampling Methods	*Non-Probability Sampling Methods*
Definition	Probability Sampling is a sampling technique in which samples from a larger population are chosen using a method based on the theory of probability	Non-probability sampling is a sampling technique in which the researcher selects samples based on the researcher's subjective judgment rather than random selection
Alternatively Known as	Random sampling method	Non-random sampling method
Population selection	The population is selected randomly	The population is selected arbitrarily
Nature	The research is conclusive	The research is exploratory
Sample	Since there is a method for deciding the sample, the population demographics are conclusively represented	Since the sampling method is arbitrary, the population demographics representation is almost always skewed
Time Taken	Takes longer to conduct since the research design defines the selection parameters before the research study begins	This type of sampling method is quick since neither the sample or selection criteria of the sample are undefined
Results	This type of sampling is entirely unbiased and hence the results are unbiased too and conclusive	This type of sampling is entirely biased and hence the results are biased too, rendering the research speculative
Hypothesis	In probability sampling, there is an underlying hypothesis before the study begins and the objective of this method is to prove the hypothesis	In non-probability sampling, the hypothesis is derived after conducting the research study

References

https://www.scribbr.com/methodology/sampling-methods/

https://www.questionpro.com/blog/types-of-sampling-for-social-research/

https://towardsdatascience.com/sampling-techniques-a4e34111d808

https://www.umsl.edu/~lindquists/sample.html