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*UNIT-V*  
*SAMPLING*

*Mrs. S. Andal, M.Sc(N).,*  
*Professor cum Research Co-ordinator*  
*Faculty of Nursing*

# SAMPLING

- Sampling is a process of selecting representative units from an entire population of study.
- In research studies it is not always possible to study an entire population; therefore the researcher draws a representative part of a population through sampling process.

# TERMINOLOGIES

- *Population*: It is the aggregation of all the units in which a researcher is interested.

Population is the set of people to which the results of a research are to be generalized.

## Cont...

- ***Target population***: It consists of total no of people or objects which are meeting the designated set of criteria. It is aggregate of all the cases with certain phenomenon about which the researcher would like to make generalization.

## Cont...

- *Accessible population*: It is aggregate of cases that conform to designated criteria and also accessible as subjects for a study.
- *Sampling*: It is the process of selecting a representative segment of the population under study.

## Cont...

- ***Sample***: It is representative unit of a target population, which is to be worked upon by researcher during their study.
- ***Element/Subject***: The individual entities that comprise the samples and population are known as elements.

## Cont...

- ***Sampling error:***

There may be fluctuations in the values of the statistics of characteristics from one sample to another or even those drawn from the same population.

- ***Sampling bias:***

Distortion that arises when a sample is not representative of the population from which it is drawn

# Purposes of Sampling

- *Economical*: With a help of sampling the researcher can save lots of time, money and resources to study a phenomenon.
- *Improved Quality of Data*: When researcher is handling the information from only a part of the population understudy.

It is easier to maintain a quality of the research worker which would not be possible in case the entire population was involved.



## Cont...

- *Quick study results*: studying an entire population itself will take a lot of time and generating research results of a large mass will be almost impossible as most research studies have time limits.

## Cont...

- *Precision and accuracy of data:* conducting a study on an entire population provides researchers with voluminous data and maintaining precision of data becomes a cumbersome task, while carrying a study on a part of the population helps the researcher to generate more precise data, where formulation of the interpretation of data becomes much easier.

# Characteristics

- *Representative*: Representativeness of the sample makes it possible to generalize the findings for the population.
- *Free from bias and errors*: A good sample is one which is free from deliberate selection of the subjects for study.

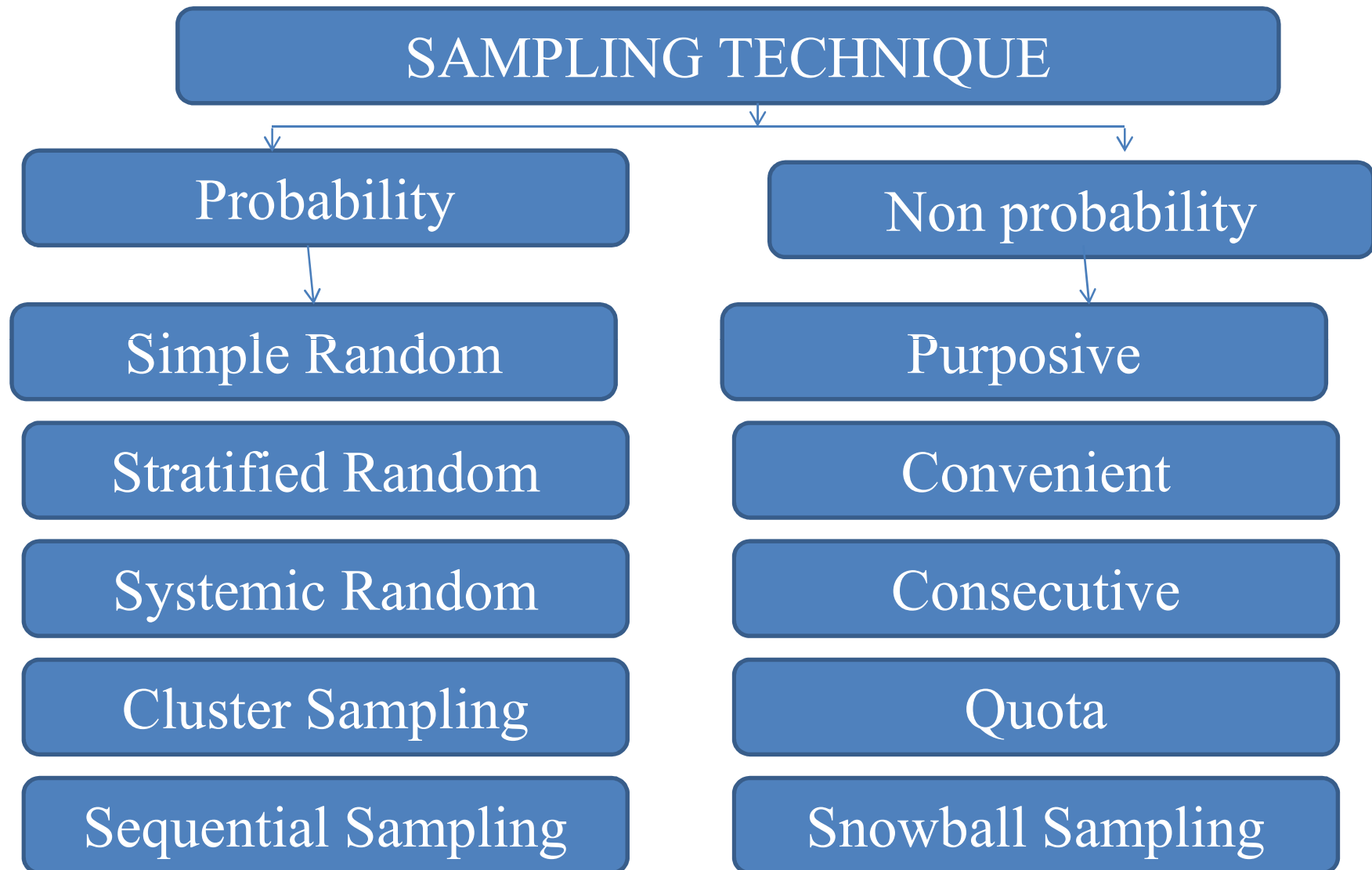
## Cont...

- *No substitutions and Incompleteness*: A sample is said to be good if once a subject is selected for the study, it is neither replaced nor is it incomplete in any aspect of researcher's interest.
- *Appropriate sample size*: It is believed that in quantitative studies the larger the sample size better is the probability of the goodness of sample.

# *Sampling Process*

- Identifying & defining target population.
- Describes the accessible population ensuring sampling frame
- Specify the sampling unit
- Specifying sample selection methods
- Determining the sample size
- Specifying sampling plan
- Selecting a desired sample

# Types of Sampling Techniques



# ***NON PROBABILITY***

- Researchers select elements by non-random methods. In this method the sample elements are arbitrarily selected by the researcher because in his judgement the elements thus chosen will most effectively represent the population.

# *Features*

- In this technique the samples are gathered in a process that does not give all the individuals in the population equal chances of being selected.
- In this subjects are usually selected on the basis of their accessibility or by the purposive personal judgement of the researcher.
- The downside of this is that an unknown proportion of the entire population is not sampled. This entails that the sample may or may not represent the entire population accurately.



# *Uses*

- This type of sampling can be used when demonstrating that a particular trait exists in the population.
- It can be used when randomization is not possible like when the population is almost limitless.
- It can be used when the research does not aim to generate results that will be used to create generalizations pertaining to entire population.
- It is also useful when the researcher has limited budget, time and workforce.

# *Purposive Sampling*

- Is more commonly known as judgmental or authoritative sampling.
- In this technique, samples are chosen by choice not by chance, through a judgment made the researcher based on his or her knowledge about the population.
- In this, the researcher believes that some subjects are fit for research compared to other individuals. This is the reason why they are purposively chosen as subjects.

## *Uses*

- It is usually used when a limited number of individuals possess the trait of interest.
- If the researcher knows a reliable professional that he or she thinks is capable of assembling a representative sample.

## *Merits*

- Simple to draw sample
- Useful in explorative studies
- Save resources
- Requires less field work

## *Demerits*

- Requires considerable knowledge about the population under study.
- It is not always reliable sample
- There is no way to evaluate the reliability of the expert or authority
- It is usually biased since no randomization was used as obtaining the sample.

# *Convenience Sampling*

- In this, subjects are selected because of their convenient accessibility and proximity to the researcher. The subjects are selected just because they are easiest to recruit for the study and the researcher did not consider selecting subjects that are representative of the entire population.

# *Uses*

- It allows the researcher to obtain basic data and trends for his study without complications.
- It also useful in documenting a particular quality of a substance that occurs within a given sample

## *Merits*

- It is considered, easiest, cheapest & least time consuming.
- It may help in saving time, money & resources.



## *Demerits*

- Chances of sampling bias
- It does not provide the representative sample from the population of the study.
- Findings generated from these samples cannot be generalized on the population

# *Consecutive Sampling*

- It is similar to convenience sampling expect that it seeks to include all accessible subjects as part of the sample.
- This technique can be considered as the best because it includes all the subjects that are available, which makes the sample a better representation of the entire population.

## *Merits*

- There is very little effort on the part of researcher when performing sampling technique.
- It is not expensive, not time consuming.
- Ensures more representatives of the selected sample.

## *Demerits*

- The researcher has no set plans about the sample size and sampling schedule.
- It always does not guarantee the selection of representative sample.
- Results from this technique cannot be used to create conclusions

# *Quota Sampling*

- In this the researcher ensures equal or proportionate representation of subjects, depending on which trait is considered as the basis of the quota.

## *Uses*

- The samples allow the researcher to sample a subgroup that is of great interest to the study.
- If a study aims to investigate a characteristic of a certain subgroup, this type of sampling is the ideal technique.

# *Merits*

- Economically cheap
- No need to approach all the candidates.
- Suitable of studies where the field work is possible

## *Demerits*

- Not possible to estimate error
- Bias is possible
- In the process of sampling these subgroups, other traits in the sample may be over presented.



# *Snow ball Sampling*

- In this technique, the researchers used to identify potential subjects in studies where subjects are hard to locate such as commercial sex workers, drug abusers etc...
- The process of snow ball sampling is much like asking samples to nominate another person with the same trait. The researcher then observes the nominated subjects & continues in the same way until obtaining sufficient number of subjects.

## *Merits*

- The chain referral process allows the researcher to reach populations that are difficult to sample when using other sampling methods.
- The process is cheap, simple and cost efficient.
- The technique needs little planning and lesser work force.

## *Demerits*

- Researcher has little control over the sampling method
- Representatives of the sample is not guaranteed
- Sampling bias is also a fear of researchers when using this sampling technique.

# *Probability Sampling*

- It involves random selection of the elements of the population. In this, every subject in a population has equal chance to be selected as the study sample.

# *Features*

- The samples are gathered in a process that gives all the individuals in the population equal chances of being selected.
- The researcher must guarantee that every individual has an equal opportunity for selection.
- The advantage of using a random sample is the absence of both systematic and sampling bias.

## *Simple Random Sampling Technique*

- In this, every member of population has an equal chance of being selected as subjects. The entire process of sampling is done in a single step, with each subject selected independently of the other members of the population.

### *Pre requisites:*

- Population must be homogeneous
- Researcher must have list of elements of accessible population

# *Subtypes*

## *Lottery Method:*

- In this method, each member of the population is assigned a unique number; each number is placed in a bowl and mixed thoroughly. The blind folded researcher then picks numbered tag from the bowl. All the individuals having numbers picked by the researcher are subjects of the study.

## *Cont...*

### *Use of Table of Random Numbers:*

- In random table, several numbers are in rows and columns. Researcher initially prepares a numbered list of the elements of the population and with a blind fold chooses a number from table.
- The same procedure is continued until the desired no of subjects is achieved.

### *Use of Computer:*

- Subjects are selected with the help of computer and by random table.



## *Cont...*

### *Merits:*

- It is ease of assembling the samples
- It is also considered a fair way of selecting a sample from given population.
- It requires minimum knowledge about population
- It is free from sampling errors
- This is one of the most unbiased probability methods of sampling

## *Cont...*

### *Demerits:*

- This method does not make use of knowledge about a population
- Lots of procedure needs to be done before sampling is accomplished.
- Expensive & time consuming process

# *Stratified Random Sampling*

- This method is used for heterogeneous population. In this researcher divides the entire population into different homogeneous subgroups or strata and then randomly selects the final subjects proportionally from the different strata.

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## *Cont...*

### *Proportionate Stratified Random Sampling:*

- In this, the sample chosen from each stratum is in proportion to the size of total population.
- The sample size of each stratum in this technique is proportionate to the population size of the stratum when viewed against the entire population. This means that the each stratum has the same sampling fraction.

### *Disproportionate Stratified Random Sampling:*

- The samples chosen from each stratum are not in proportion to size of total population in that stratum. The only difference between these two stratified random sampling is their sampling fraction.

## *Cont...*

### *Merits:*

- It ensures representation of all groups in a population
- Researchers also employ this sampling when they want to observe existing relationship between two or more groups.
- With this sampling researcher can representatively sample even the smallest and most in accessible subgroups in population.
- There is a high statistical precision compared to simple random sampling.

## *Cont...*

### *Demerits:*

- Proportionate stratification requires accurate information on the proportion of population in each stratum.
- Large population must be available from which to select subjects

# *Systematic Random Sampling*

- It can be likened to an arithmetic progression where in the difference between any two consecutive numbers is the same.
- It involves the selection of every  $k^{\text{th}}$  cases from list of group.
- $K = N/n =$  no of subjects in target population/size of sample

## *Cont...*

### *Merits:*

- Convenient & simple to carry out
- Distribution of sample is spread evenly over entire population
- Less cumbersome, time consuming & is cheaper

### *Demerits:*

- If first subject is not randomly selected then it becomes non random sampling technique.
- Sometime this may result in biased sample.



# *Cluster Sampling*

- Cluster sampling means random selection of sampling unit consisting of population elements. Then from each selected sampling unit, a sample of population elements is drawn by either simple random selection or stratified random sampling.
- This method is used in case where the population elements are scattered over a wide area & it is impossible to obtain list of all elements.

## *Types:*

*One stage cluster sample*

*Two stage cluster sample*

## *Cont...*

### *One stage cluster sample:*

- This occurs when the researcher includes all the samples from all the randomly selected clusters as sample.

### *Two stage cluster sample:*

- This occurs when the researcher only selects a few numbers of samples from each cluster by simple or systematic random sampling.

## *Cont...*

### *Merits:*

- This technique is cheap, quick & easy for large population.
- Large population can be studied & require only list of the members
- Enables investigators to use existing divisions such as districts, villages/towns etc...
- Same cluster can be used again for study.

## *Cont...*

### *Demerits:*

- This technique has a possibility of high sampling error.
- If small homogeneous population is under study this technique is not at all useful

# *Sequential Sampling*

- In this, the sample size is not fixed, the investigator initially selects small sample & tries out to make inferences; if not able to draw results, he or she adds more subjects until clear cut inferences can be drawn.

## *Cont...*

### *Merits:*

- Facilitates to conduct study on best possible smallest representative sample.
- Helping in ultimately finding the inferences of the study.

### *Demerits:*

- It is not possible to study a phenomenon which is needed to be studied at one point of time.
- Requires repeated entries into the field to collect sample.

# *Sampling Error*

It is the deviation of the selected sample from the true characteristics, traits, behaviors, qualities or figures the entire population.

## *Reasons for Sampling Error:*

- Researchers draw different subjects from the same population but the subjects have individual difference.
- Biased sampling procedure
- Chance or randomization.
- Systematic error.

# *Cont...*

## **Sampling Bias**

- It is a tendency to favor a selection of sample units that possess particular characteristics.

### **Types:**

- *Self-selection Bias*
- *Exclusion Bias*
- *Healthy User Bias*



## *Cont...*

- *Self-selection Bias*: When the participants in the study have some kind of control over the study to participate or not.
- *Exclusion Bias*: This happens when some people of the group are eliminated from the study.
- *Healthy User Bias*: This happens when the sample selected has more likelihood to be healthier as compared to general population.

# *Problems of Sampling*

- Sampling errors
- Lack of sample representativeness.
- Difficulty in estimation of sample size.
- Lack of knowledge about the sampling process
- Lack of resources.
- Lack of co-operation.
- Lack of existing appropriate sampling frames for larger population.
- Callous (casual) approach of researcher towards sampling process.