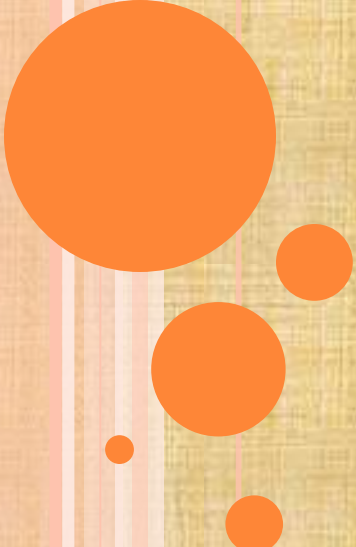


SAMPLING TECHNIQUE/PROBABILITY

SAMPLING



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SAMPLING TECHNIQUES

- Categorized as Probability & Non probability
- **Probability samples**
 - Through a process of random selection
 - Every unit in the population has an equal chance of being chosen
 - Free of Bias
- **Nonprobability samples**
 - Through a process of nonrandom methods
 - Chance of selection is not known



- Sample: A sample is “a smaller (but hopefully representative) collection of units from a population used to determine truths about that population”
- Sampling frame: is the list from which the potential respondents are drawn



- Population: A population can be defined as including all people or items with the characteristic one wishes to understand.
- Because there is very rarely enough time or money to gather information from everyone or everything in a population, the goal becomes finding a representative sample (or subset) of that population.



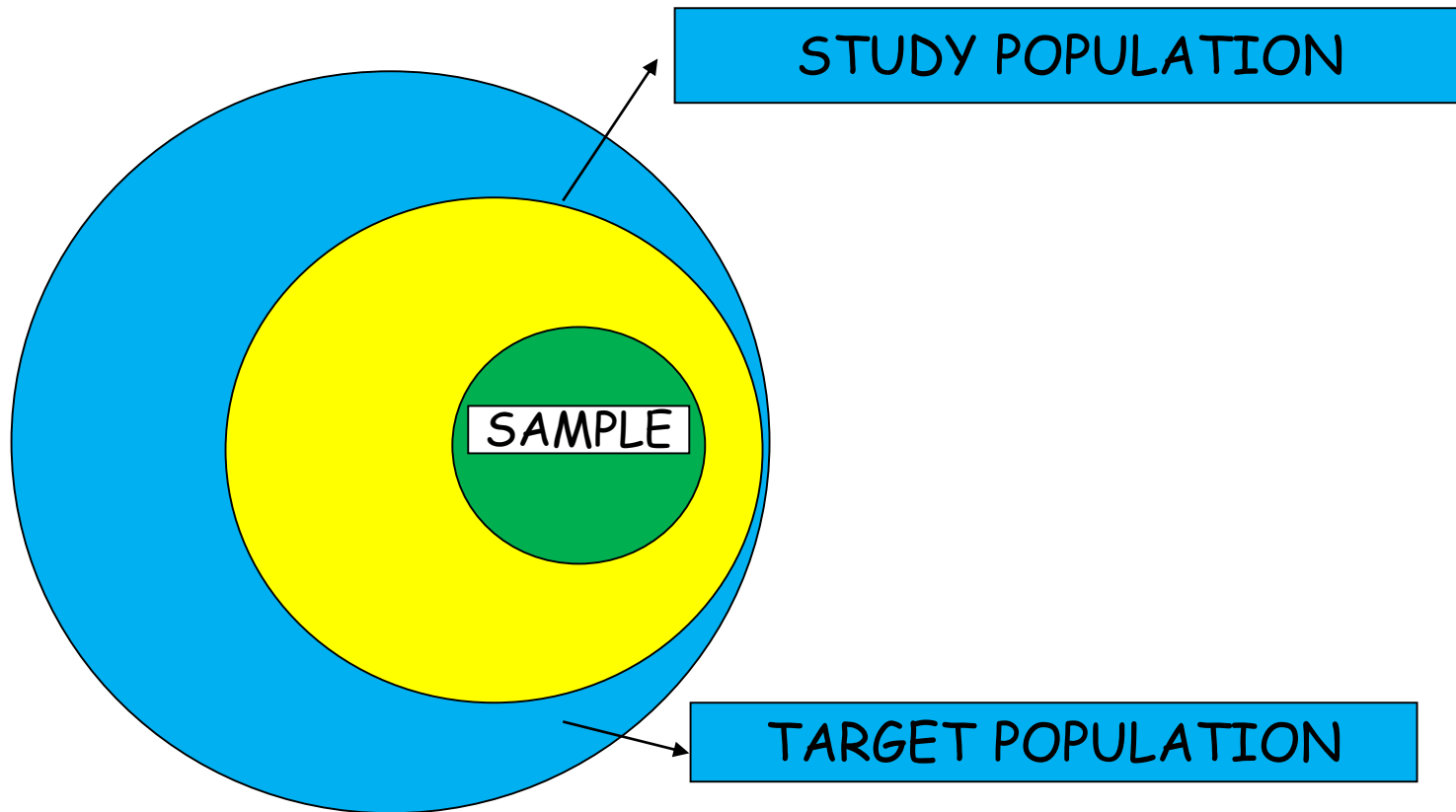
- 3 factors that influence sample representativeness
 - Sampling procedure
 - Sample size
 - Participation (response)



SAMPLING PROCESS

- The sampling process comprises several stages:
 - Defining the population of concern
 - Specifying a sampling frame, a set of items or events possible to measure
 - Specifying a sampling method for selecting items or events from the frame
 - Determining the sample size
 - Implementing the sampling plan
 - Sampling and data collecting
 - Reviewing the sampling process





DIFFERENCES

| | Probability Sampling | Non probability Sampling |
|---------------------------------|---|--|
| Meaning | Probability sampling is a sampling technique, in which the subjects of the population get an equal opportunity to be selected as a representative sample. | Nonprobability sampling is a method of sampling wherein, it is not known that which individual from the population will be selected as a sample. |
| Known as | Random sampling | Non-random sampling |
| Basis of selection | Randomly | Arbitrarily |
| Opportunity of selection | Fixed and known | Non fixed and unknown |
| Research | Conclusive | Exploratory |
| Result | Unbiased | Biased |
| Method | Objective | Subjective |
| Inferences | Statistical | Analytical |
| Hypothesis | Tested | Generated |

PROBABILITY SAMPLING

- The sampling method in which all the members of the population has a pre-specified and an equal chance to be a part of the sample.
- This technique is based on the randomization principle, wherein the procedure is so designed, which guarantees that each and every individual of the population has an equal selection opportunity.
- This helps to reduce the possibility of bias.
- The methods of probability sampling:
 - **Simple Random Sampling**
 - **Stratified Sampling**
 - **Cluster Sampling**
 - **Systematic Sampling**



NON-PROBABILITY SAMPLING

- When all the individuals of the population are not given an equal opportunity of becoming a part of the sample, the method is said to be Non-probability sampling.
- There is no probability attached to the unit of the population and the selection relies on the subjective judgment of the researcher.
- The methods of non-probability sampling:
 - **Convenience Sampling**
 - **Quota Sampling**
 - **Judgment or Purposive Sampling**
 - **Snowball Sampling**



SIMPLE RANDOM SAMPLING

- Applicable when population is small, homogeneous & readily available
- All subsets of the frame are given an equal probability.
- Each element of the frame thus has an equal probability of selection.
- It provides for greatest number of possible samples.
- This is done by assigning a number to each unit in the sampling frame.
- A table of random number or lottery system is used to determine which units are to be selected.



- **Advantages:**

- Estimates are easy to calculate.

- Simple random sampling is always an equal probability of selection design, but not all equal probability of selection designs are simple random sampling.

- **Disadvantages:**

- If sampling frame large, this method impracticable.

- Minority subgroups of interest in population may not be present in sample in sufficient numbers for study.



SYSTEMATIC SAMPLING

- It relies on arranging the target population according to some ordering scheme and then selecting elements at regular intervals through that ordered list.
- Systematic sampling involves a random start and then proceeds with the selection of every k th element from then onwards. In this case, $k = (\text{population size} / \text{sample size})$.
- It is important that the starting point is not automatically the first in the list, but is instead randomly chosen from within the first to the k th element in the list.
- A simple example would be to select every 10th name from the telephone directory (an 'every 10th' sample, also referred to as 'sampling with a skip of 10').



- **ADVANTAGES:**

- Sample easy to select
- Suitable sampling frame can be identified easily
- Sample evenly spread over entire reference population

- **DISADVANTAGES:**

- Sample may be biased if hidden periodicity in population coincides with that of selection.
- Difficult to assess precision of estimate from one survey.



STRATIFIED SAMPLING

Where population embraces a number of distinct categories, the frame can be organized into separate "strata." Each stratum is then sampled as an independent sub-population, out of which individual elements can be randomly selected.

- Every unit in a stratum has same chance of being selected.
- Using same sampling fraction for all strata ensures proportionate representation in the sample.
- Adequate representation of minority subgroups of interest can be ensured by stratification & varying sampling fraction between strata as required.



- Finally, since each stratum is treated as an independent population, different sampling approaches can be applied to different strata.
- **Drawbacks** to using stratified sampling.
- First, sampling frame of entire population has to be prepared separately for each stratum
- Second, when examining multiple criteria, stratifying variables may be related to some, but not to others, further complicating the design, and potentially reducing the utility of the strata.
- Finally, in some cases (such as designs with a large number of strata, or those with a specified minimum sample size per group), stratified sampling can potentially require a larger sample than would other methods



POSTSTRATIFICATION

Stratification is sometimes introduced after the sampling phase in a process called "poststratification".

- This approach is typically implemented due to a lack of prior knowledge of an appropriate stratifying variable or when the experimenter lacks the necessary information to create a stratifying variable during the sampling phase. Although the method is susceptible to the pitfalls of post hoc approaches, it can provide several benefits in the right situation. Implementation usually follows a simple random sample. In addition to allowing for stratification on an ancillary variable, poststratification can be used to implement weighting, which can improve the precision of a sample's estimates.



OVERSAMPLING

- Choice-based sampling is one of the stratified sampling strategies. In this, data are stratified on the target and a sample is taken from each strata so that the rare target class will be more represented in the sample. The model is then built on this biased sample. The effects of the input variables on the target are often estimated with more precision with the choice-based sample even when a smaller overall sample size is taken, compared to a random sample. The results usually must be adjusted to correct for the oversampling.



CLUSTER SAMPLING

- Cluster sampling is an example of 'two-stage sampling' .
- First stage a sample of areas is chosen;
- Second stage a sample of respondents *within* those areas is selected.
- Population divided into clusters of homogeneous units, usually based on geographical contiguity.
- Sampling units are groups rather than individuals.
- A sample of such clusters is then selected.
- All units from the selected clusters are studied.



- Advantages :
- Cuts down on the cost of preparing a sampling frame.
- This can reduce travel and other administrative costs.
- Disadvantages: sampling error is higher for a simple random sample of same size.
- Often used to evaluate vaccination coverage in EPI



Two types of cluster sampling methods.

One-stage sampling. All of the elements within selected clusters are included in the sample.

Two-stage sampling. A subset of elements within selected clusters are randomly selected for inclusion in the sample.



DIFFERENCE BETWEEN STRATA AND CLUSTERS

- Although strata and clusters are both non-overlapping subsets of the population, they differ in several ways.
- All strata are represented in the sample; but only a subset of clusters are in the sample.
- With stratified sampling, the best survey results occur when elements within strata are internally homogeneous. However, with cluster sampling, the best results occur when elements within clusters are internally heterogeneous



THANK YOU

