

SAMPLING TECHNIQUES

Presentation by

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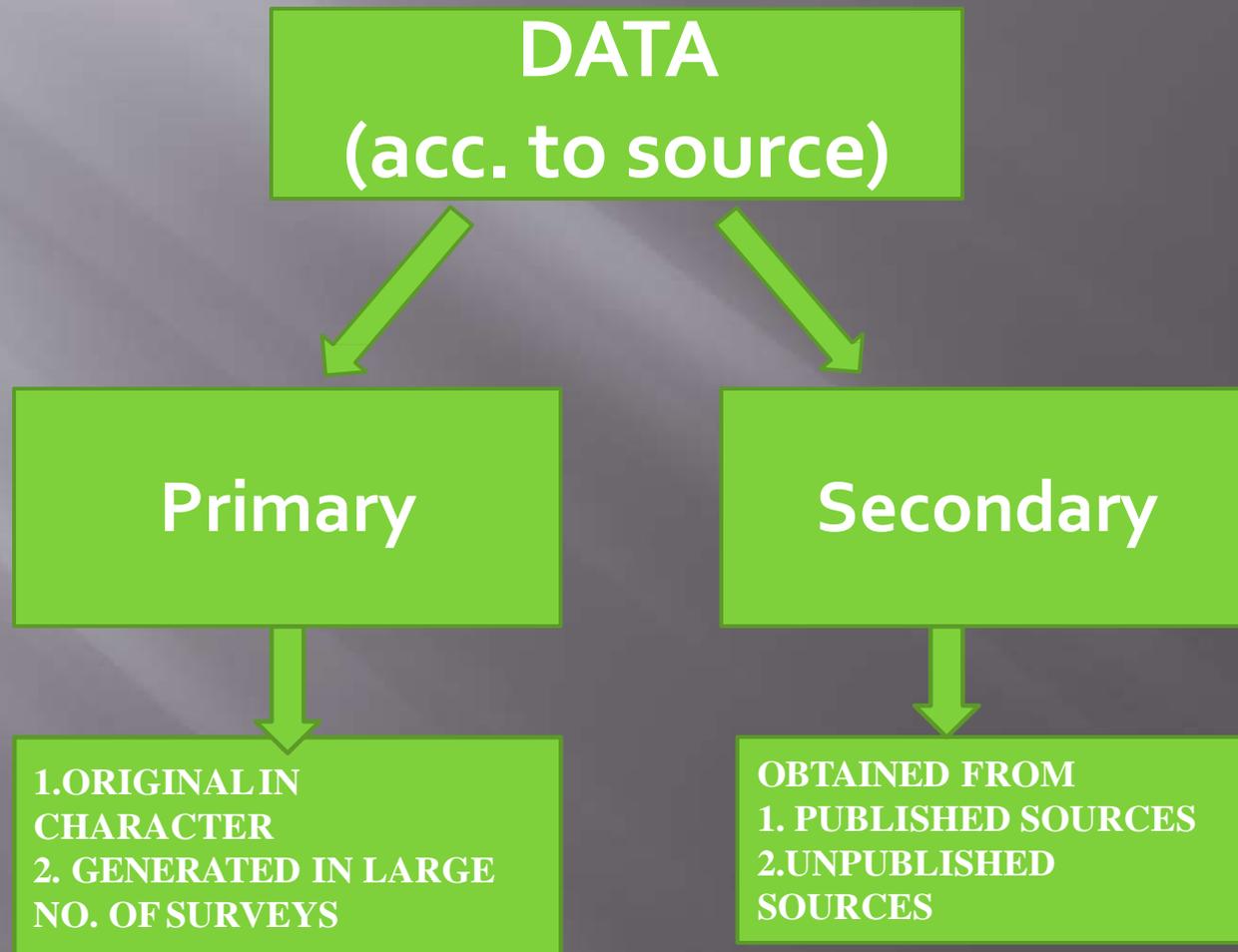
DEFINITION

- Sampling is a process of selecting representative units from an entire population of a study.
- Sampling is the selection of some part of an aggregate or a whole on the basis of which judgments or inferences about the aggregate or mass is made.
- Sample is defined as the representative fraction of the population

SAMPLING

- **Sampling:** the process of learning about population on the basis of sample drawn from it.
- **Three elements** in process of sampling:
 - Selecting the sample
 - Collecting the information
 - Making inference about population
- **Statistics:** values obtained from study of a sample.
- **Parameters:** such values from study of population.

NEED FOR SAMPLING



NEED FOR SAMPLING

- When secondary data are not available for the problem under study , primary data is collected.
- Two methods –
 - **Census method** or complete enumeration method
 - **Sample method**

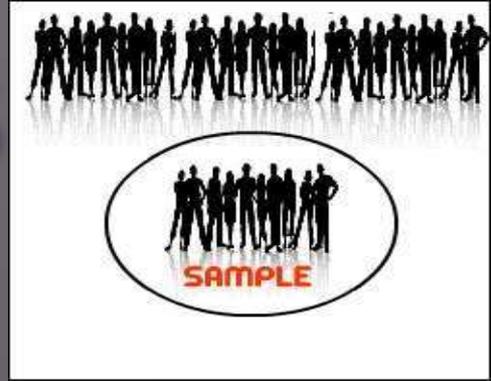
PURPOSE OF SAMPLING

- ***Economical:*** Sometimes, it is not possible & economical for researchers to study an entire population. Thus, sampling can save lots of time, money, & resources to study a phenomenon.
- ***Improved quality of data***
- ***Quick study results***
- ***Precision and accuracy of data***

CHARACTERISTICS OF GOOD SAMPLE

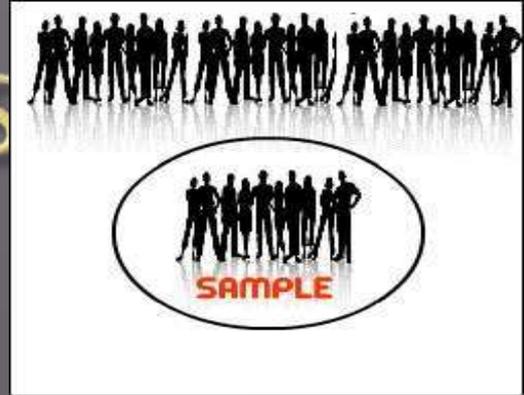
- Representative
- Free from bias and errors
- No substitution and incompleteness
- Appropriate sample size

THEORETICAL BASIS SAMPLING



- On the basis of sample study we can predict and generalize the **behavior of mass phenomena.**
- There is no statistical population whose elements would vary from each other without limit.

THEORETICAL BASIS SAMPLING



- **Law of Statistical Regularity-**
 - Sample is taken at random from a population, it is likely to possess same characteristics as that of population.

- **Law of inertia of large numbers-**
 - Larger the size of sample, more accurate the results are likely to be.



SAMPLING PROCESS

- 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 collection

SAMPLING PROCESS

Identifying and defining the target population



Describing the accessible population & ensuring sampling frame



Specifying the sampling unit



Specifying sampling selection methods



Determining the sample size



Specifying the sampling plan



Selecting a desired sample

FACTORS INFLUENCING SAMPLING PROCESS

- **Nature of the researcher**
 - ✓ Inexperienced investigator
 - ✓ Lack of interest
 - ✓ Lack of honesty
 - ✓ Intensive workload
 - ✓ Inadequate supervision
- **Nature of the sample**
 - ✓ Inappropriate sampling technique
 - ✓ equate supervision
 - ✓ Sample size
 - ✓ Defective sampling frame
- **Circumstances**
 - ✓ Lack of time
 - ✓ Large geographic area
 - ✓ Lack of cooperation
 - ✓ Natural calamities

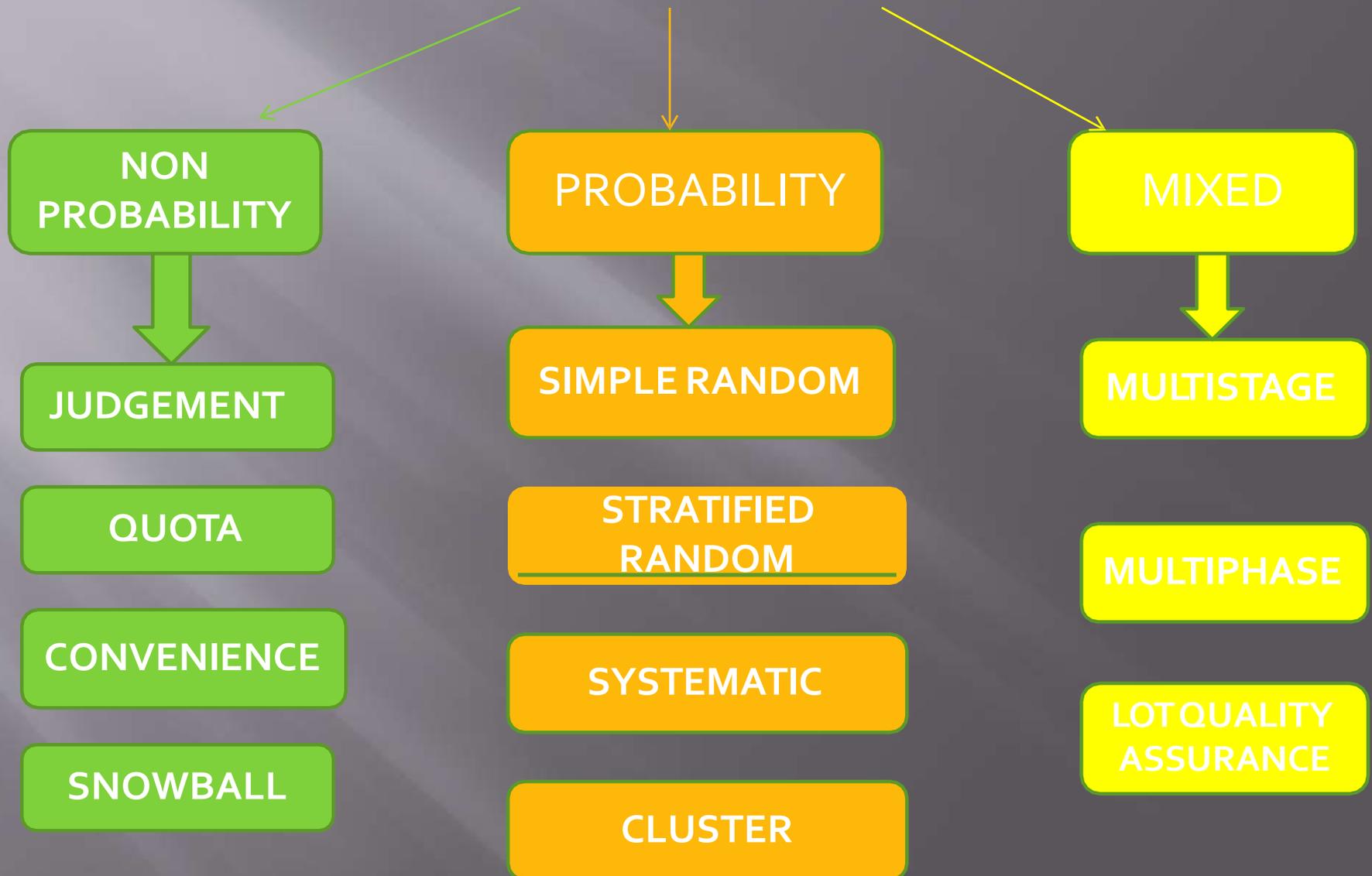
ADVANTAGES OF SAMPLING

- Less resources (time, money)
- Less workload.
- Gives results with known accuracy that can be calculated mathematically.

ESSENTIALS OF SAMPLING

- **Representativeness** - ensure by random selection
- **Adequacy** - sample size
- **Independence** - same chance of selection
- **Homogeneity** - no basic difference in nature of units.

SAMPLING METHODS



NON PROBABILITY SAMPLING

JUDGEMENT SAMPLING

- Judgement/Purposive/Deliberate sampling.
- Depends exclusively on the **judgement of investigator.**
- Sample selected which investigator thinks to be most **typical of the universe.**

JUDGEMENT SAMPLING

- **Merits**

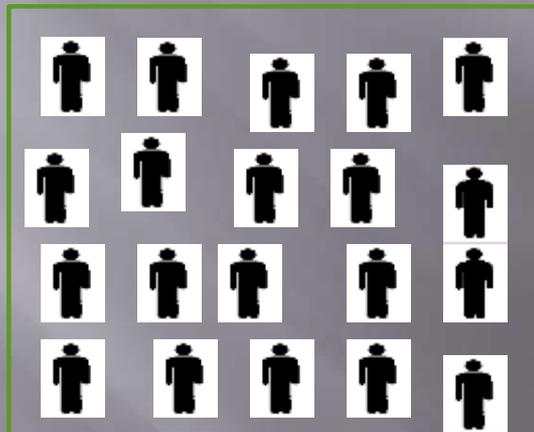
- Small no. of sampling units
- Study unknown traits/case sampling
- Urgent public policy & business decisions

- **Demerits**

- Personal prejudice & bias
- No objective way of evaluating reliability of results

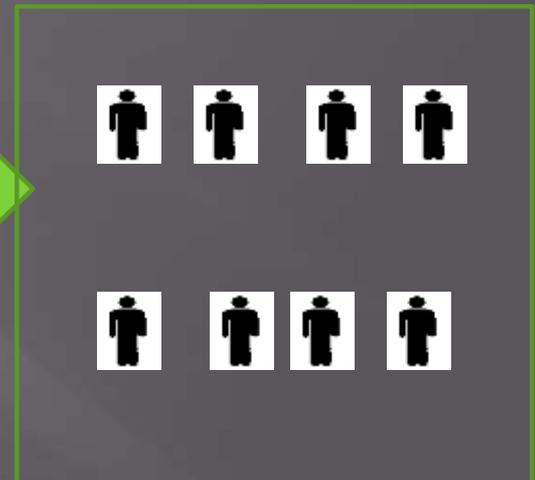
JUDGEMENT SAMPLING - EXAMPLE

Sample size for a study=8



CLASS OF 20 STUDENTS

JUDGMENT



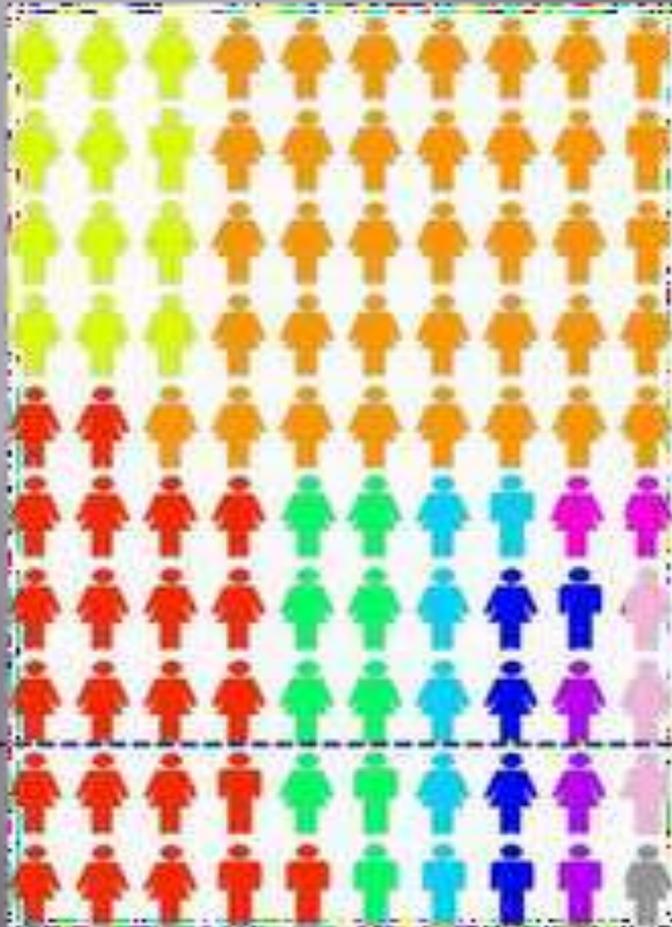
SAMPLE OF 8
STUDENTS

CONVENIENCE SAMPLING

- **Convenient** sample units selected.
- Selected neither by probability nor by judgment.
- **Merit** – useful in pilot studies.
- **Demerit** – results usually biased and unsatisfactory.

CONVENIENCE SAMPLING - EXAMPLE

Class of 100 students



20 Students selected as per
convenience

Convenience Sampling

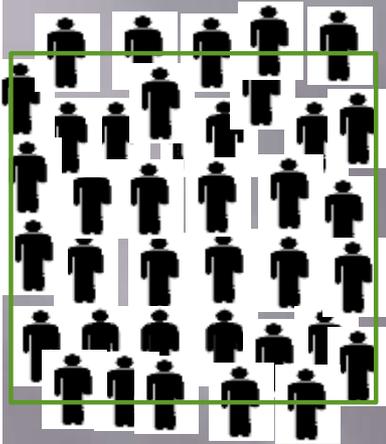


QUOTA SAMPLING

- Most commonly used in non probability sampling.
- Quotas set up according to some specified characteristic.
- Within the quota , selection depends on personal judgment.
- **Merit**- Used in public opinion studies
- **Demerit** – personal prejudice and bias

QUOTA SAMPLING - EXAMPLE

Radio listening survey



Quota Formation

60%
housewives

25%
farmers

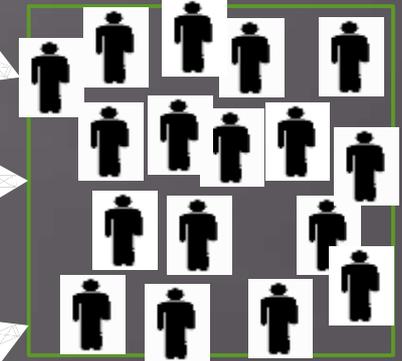
15% children
under age 15

300

125

Personal judgement

75



Interview 500 people

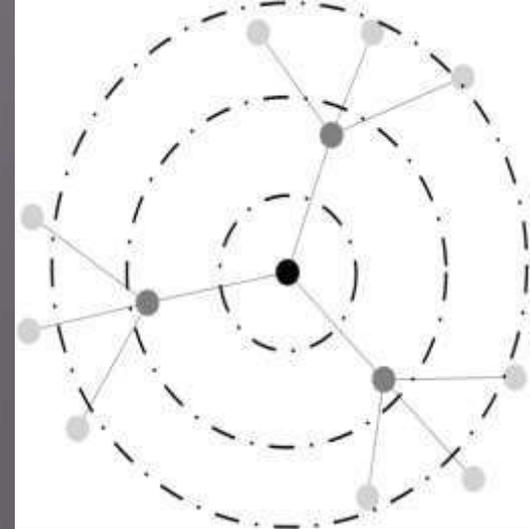
500 people

SNOWBALL SAMPLING

- A special non probability 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 - STEPS

- Make **contact with one or two cases** in the population.
- Ask **these cases to identify further cases.**
- Ask these new cases to identify further new cases.
- Stop when either no new cases are given or the sample is as large as is manageable.



SNOWBALL SAMPLING

- **Merit**

- access to difficult to reach populations (other methods may not yield any results).

- **Demerit**

- not representative of the population and will result in a biased sample as it is self-selecting.

PROBABILITY SAMPLING TECHNIQUE

Probability sampling

- It is based on the theory of probability.
- It involve random selection of the elements/members of the population.
- In this, every subject in a population has equal chance to be selected sampling for a study.
- In probability sampling techniques, the chances of systematic bias is less as samples is selected randomly

Types of the probability sampling

1. Simple random sampling
2. Stratified random sampling
3. Systematic random sampling
4. Cluster/multistage sampling
5. Sequential sampling

Simple random sampling

- This is the most pure & basic probability sampling design.
- In this type of sampling design, every member of population has an equal chance of being selected as subject.
- The entire process of sampling is done in a single step, with each subject selected independently of the other members of the population
- There is need of two essential prerequisites to implement the simple random technique: population must be homogeneous & researcher must have list of the elements

- The first step of the simple random sampling technique is to identify the accessible population & prepare a list of all the elements/members of the population. The list of the subjects in population is called as sampling frame & sample drawn from sampling frame by using following methods:
 - ❑ The lottery method
 - ❑ The use of table of random numbers
 - ❑ The use of computer

The lottery method...

- It is most primitive & mechanical method.
- Each member of the population is assigned a unique number.
- Each number is placed in a bowl or hat & mixed thoroughly.
- The blind-folded researcher then picks numbered tags from the hat.
- All the individuals bearing the numbers picked by the researcher are the subjects for the study.

The use of table of random numbers...

- This is most commonly & accurately used method in simple random sampling.
- Random table present several numbers in rows & columns.
- Researcher initially prepare a numbered list of the members of the population, & then with a blindfold chooses a number from the random table.
- The same procedure is continued until the desired number of the subject is achieved.

The use of computer...

- Nowadays random tables may be generated from the computer , & subjects may be selected as described in the use of random table.
- For populations with a small number of members, it is advisable to use the first method, but if the population has many members, a computer-aided random selection is preferred.

Merits and Demerits

Merits

- Ease of assembling the sample
- Fair way of selecting a sample
- Require minimum knowledge about the population in advance
- It unbiased probability method

Free from sampling

Demerits

- It requirement of a complete & up-to-date list of all the members of the population.
- Does not make use of knowledge about a population which researchers may already have.
- Lots of procedure need to be done before sampling
- Expensive & time-consuming

Stratified Random Sampling

- This method is used for heterogeneous population.
- It is a probability sampling technique wherein the researcher divides the entire population into different homogeneous subgroups or strata, & then randomly selects the final subjects proportionally from the different strata.
- The strata are divided according to selected traits of the population such as age, gender, religion, socio-economic status, diagnosis, education, geographical region, type of institution etc

Merits and Demerits

Merits

- It representation of all group in a population
- For observing relation between subgroup
- Observe smallest & most inaccessible subgroups in population
- Higher statistical precision
- Save lot of time, money, & effort

Demerits

- It require accurate information on the proportion of population in each stratum.
- Large population must available from which select sample
- Possibility of faulty classification

Systematic Random Sampling

- It can be likened to an arithmetic progression, wherein the difference between any two consecutive numbers is the same.
- It involves the selection of every K th case from list of group, such as every 10th person on a patient list or every 100th person from a phone directory.
- Systematic sampling is sometimes used to sample every K th person entering a bookstore, or passing down the street or leaving a hospital & so forth
- Systematic sampling can be applied so that an essentially random sample is drawn.

Merits and Demerits

Merits

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

Demerit

- If first subject is not randomly selected, then it becomes a nonrandom sampling technique
- Sometimes this may result in biased sample.
- If sampling frame has nonrandomly, this sampling technique may not be appropriate to select a representative sample.

Cluster or multistage Sampling

- It is done when simple random sampling is almost impossible because of the size of the population.
- 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 cases where the population elements are scattered over a wide area, & it is impossible to obtain a list of all the elements.
- The important thing to remember about this sampling technique is to give all the clusters equal chances of selection

Merits and Demerits

Merits

- It cheap, quick, & easy for a large population.
- Large population can be studied, & require only list of the members.
- Investigators to use existing division such as district, village/town, etc.
- Same sample can be used again for study

Demerits

- This technique is the least representative of the population.
- Possibility of high sampling error
- This technique is not at all useful.

Sequential Sampling

- This method of sample selection is slightly different from other methods.
- Here 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 then adds more subjects until clear-cut inferences be drawn.

Merits and Demerits

- Facilitates to conduct a study on best-possible smallest representative sample.
- Helping in ultimately finding the inferences of the study.
- With this sampling technique it is not possible to study a phenomenon which needs to be studied at one point of time.
- Requires repeated entries into the field to collect the sample.

ERRORS

```
graph TD; ERRORS[ERRORS] --> SAMPLING[SAMPLING ERRORS]; ERRORS --> NON_SAMPLING[NON SAMPLING ERRORS]; SAMPLING --> SAMPLE[SAMPLE]; NON_SAMPLING --> SAMPLE_AND_CENSUS[SAMPLE AND CENSUS];
```

SAMPLING
ERRORS

SAMPLE

NON SAMPLING
ERRORS

SAMPLE AND
CENSUS

SAMPLING ERRORS

```
graph TD; A[SAMPLING ERRORS] --> B[BIASED]; A --> C[UNBIASED]; B --> D[ELIMINATION OF ALL SOURCES OF BIAS]; C --> E[INCREASE SAMPLE SIZE]
```

BIASED

**ELIMINATION OF
ALL SOURCES OF
BIAS**

UNBIASED

**INCREASE SAMPLE
SIZE**

NON SAMPLING ERRORS

- Data specification inadequate & inconsistent with respect to objective of census.
- Inaccurate or inappropriate methods of **interview, observation, definitions.**
- Lack of **trained & experienced investigators.**
- Errors due to **non response.**
- Errors in **data processing operations**
- Errors committed during **presentation.**

MORE IN COMPLETE ENUMERATION SURVEY

THANK
YOU!

