# SAMPLING DESIGNS

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# INTRODUCTION:
# Concepts of Sampling

## Why Sampling?

1. Limited Resources
2. Feasibility
3. Lack of access to population units

# Advantages of Sampling:

1. **Reduced cost of the survey**
2. **Greater speed**
3. **Greater accuracy**
4. **More scope**
5. **Higher response**
6. **Quality information**
7. **Allowance of error**

# Disadvantages/Limitations of Sampling

1. Sampling as well as non-sampling errors
2. Feeling of discrimination
3. Requirement of representative sample of optimum size

## Characteristics of Sample

1. Representative of population
2. Optimum sample size

# Terminology

- Sampling Frame
- Sampling Unit
- Study Unit
- Sampling Fraction ( n/N )
- Statistic/Estimate
- Parameter
- Sampling and Non-Sampling Errors
- Standard Error
- Precision {n½/ s.d.}
- Hypothesis
- Null Hypothesis

# Sampling Techniques

1. Purposive/Judgment Non-Probability /Non-Random Sampling
2. Random/probability Sampling

## Types of Random Sampling:

a) Sampling with Equal Probability
b) Sampling with unequal probability e.g.. Sampling with probability proportional to size (PPS)

# SAMPLING DESIGNS

- Simple Random Sampling (SRS)
- Stratified Sampling
- Systematic Sampling
- Cluster Sampling
- Multi-stage sampling
- Multi-phase sampling
- WHO-30 cluster sampling

# SIMPLE RANDOM SAMPLING (SRS) SELECTION

- Balloting
- Mechanical Devices of Randomization
- Random Number Tables

# Brief description to some other random sampling procedures

- Stratified Sampling
- Systematic Sampling
- Cluster Sampling
- Multi-stage sampling
- Multi-phase sampling
- WHO-30 cluster sampling

# Situations of Using PPS Sampling

When sampling units vary in sizes and situations demand to give importance to no of study units within sampling units :

- Sampling of villages with different populations
- Sampling of households with varying sizes

# PPS sampling selection techniques

1. Hansen and Hurwitz (1943) technique

1. Lahiri Method (1951).

## Hansen and Hurwitz (1943) technique

- Units are selected with probability prop to size
- Higher probability is assigned to larger units

Method of selection:

1. List units with respective size/population
2. Find cumulative sizes/population of different units
3. Assign ranges of selection for different units on the basis of cum sizes
4. Draw a random number between 1 and total size/population
5. Draw unit if the random number falls within the assigned range of that unit otherwise not

# Example

| Unit | Size | Cum size | Assigned Range |
|---|---|---|---|
| 1 | 3 | 3 | 1-3 |
| 2 | 1 | 4 | 4 |
| 3 | 11 | 15 | 5-15 |
| 4 | 6 | 21 | 16-21 |
| 5 | 4 | 25 | 22-25 |
| 6 | 2 | 27 | 26-27 |
| 7 | 3 | 30 | 28-30 |

## Lahiri Method (1951)

In case of large no of units in the popn (N), cumulation of sample size as desired in Hansen and Hurwitz method becomes time consuming, we can draw units without cumulation by Lahiri Method:

- Draw a random number ‘n’ between 1and N
- Draw an another random number ‘m’ between 1 and max size of the unit M max.
- If m≤ Mi,  then ith unit is selected otherwise another pair of random numbers is attempted.

# WHO-30 CLUSTER SAMPLING

- Uses
- Methods of Selection
- Refinements
- UIP and PP coverage examples.

# Characteristics of PPS Sampling:

- Units vary in their sizes and parameter under study is highly correlated with the size of the units.
- Prob of selection is to be assigned in proportion to the size.
- Different from SRS.

  (prob of selection changes for each unit from draw to draw)
- PPS may be without replacement (PPSWOR) and also with replacement (PPSWR).

# THANK YOU