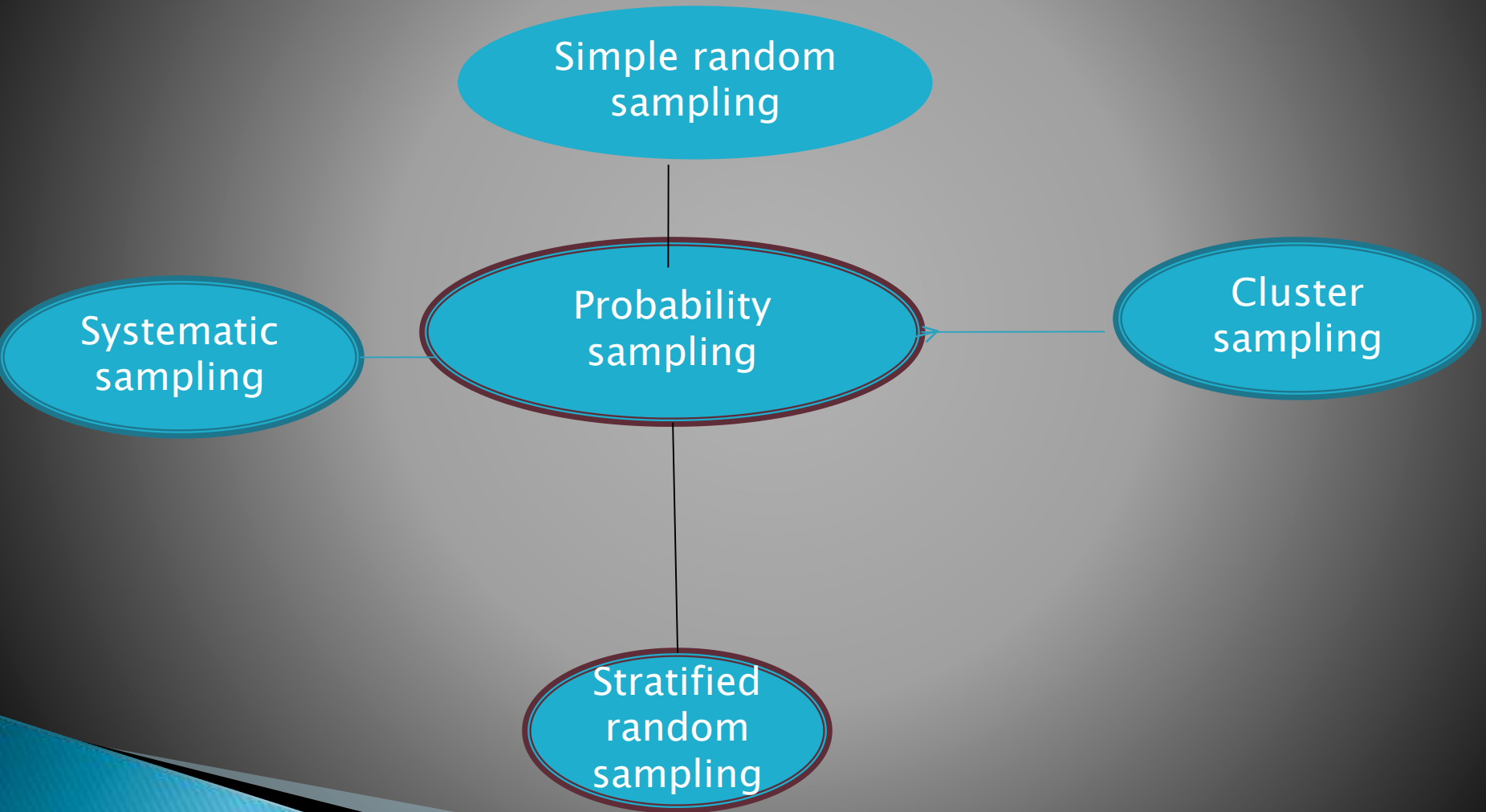
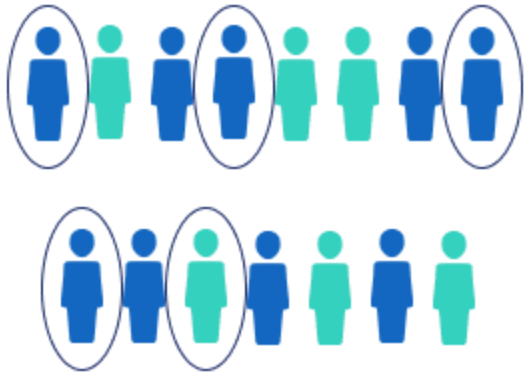


**CC-6: unit-2: Sampling  
Method: Probability sampling**

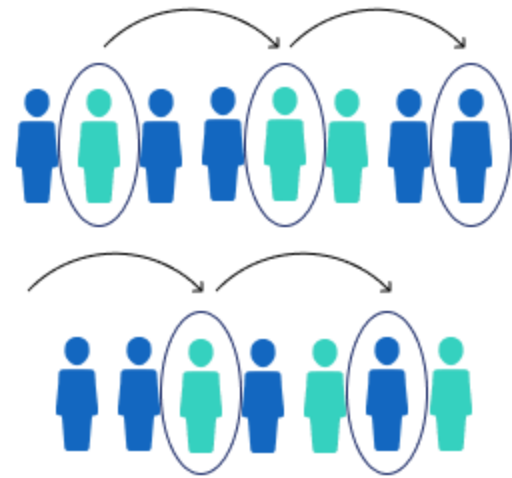
# Sampling Methods



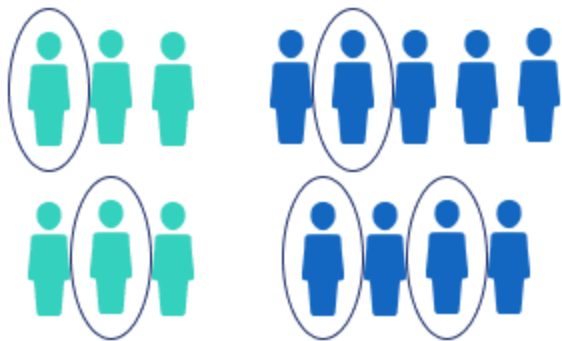
## Simple random sample



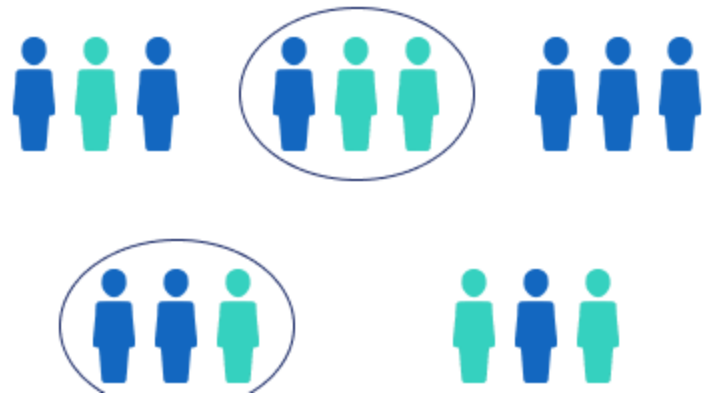
## Systematic sample



## Stratified sample



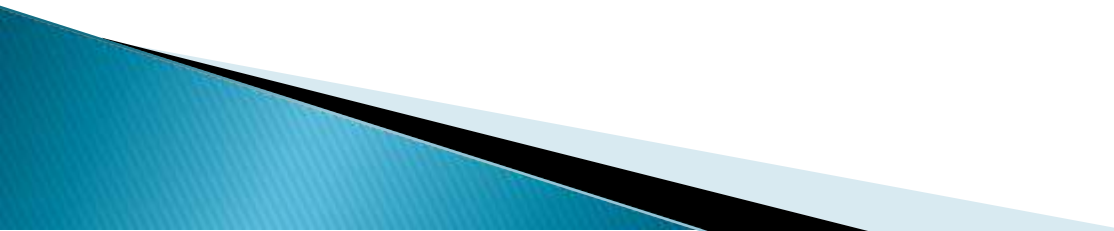
## Cluster sample



# Concept of Probability sampling

This method clearly specifies the probability or likelihood of inclusion of each element or individual in the sample.

Conditions to be satisfied :

1. Complete list of subjects to be studied is available.
  2. Size of population must be known
  3. Desire sample size must be specified
  4. Each element must have an equal chance of being selected
- 

# Simple random sampling

Each and every individual of the population has an equal chance of being included in the sample.

## Methods of drawing random sample

### 1. Fishbowl draw method

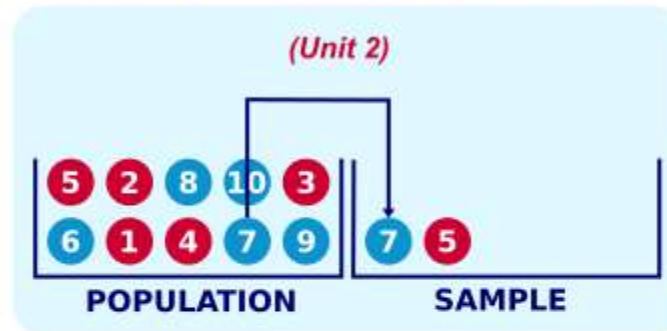
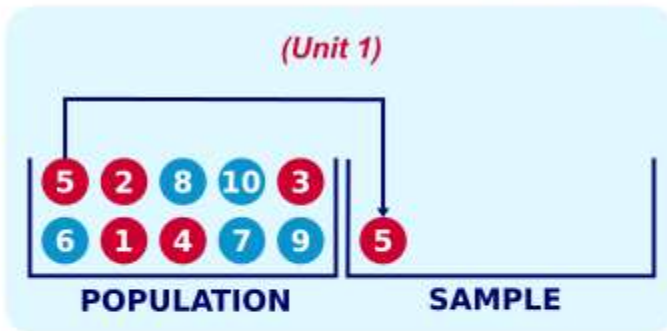
It follows four steps–

- a. Constructing the sampling frame i.e., a list of the units of the target population.
- b. The entire elements or individuals of the population are numbered on slips of paper of equal size, color etc.
- c. All these slips are folded in one and the same way and are put in a container or a bowl.
- d. Mixing the slips thoroughly, the investigator, in a blind folded position, selects one number at a time until the desired sample size is obtained.

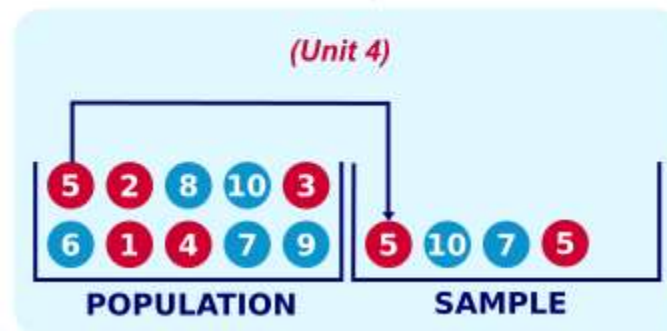
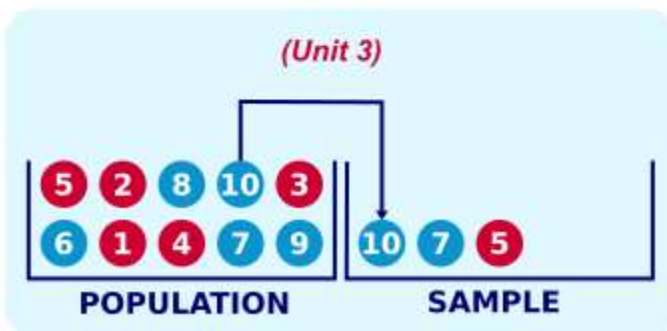
### Limitation

- a. Can't be applied to large population
- b. the investigator may select some slips while purposefully excluding others

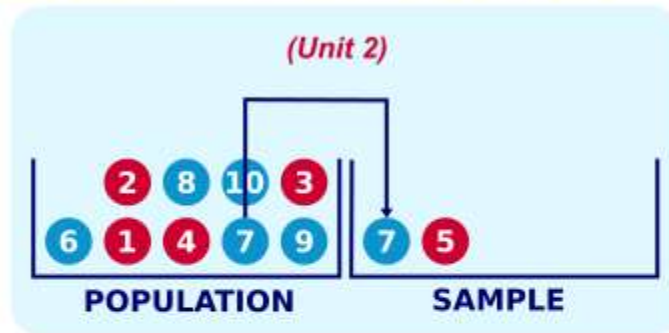
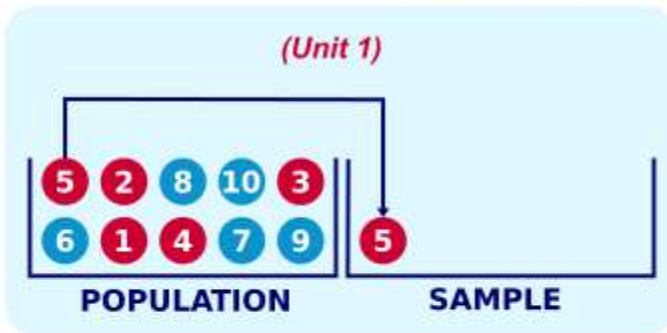
## SIMPLE RANDOM SAMPLING *WITH* REPLACEMENT



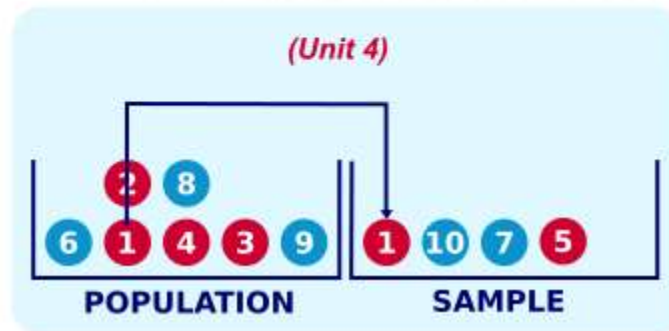
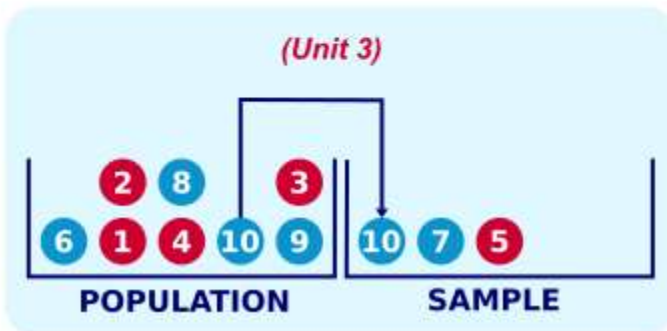
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## SIMPLE RANDOM SAMPLING WITHOUT REPLACEMENT



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## ▶ 2. Random number table

- ▶ Generally Tippett 's random number table are used . It consists of continuous row–columns sequence of 10400 four / five figure numbers which do not appear in any particular sequence. The investigator would enter the table at any point. He may move systematically to the right, left, up, down or diagonally, skipping the numbers that are large and also those that have already been drawn.

Advantage– easily accessible to the researchers

Disadvantage– can't be used when the size of population exceeds four or five digits.

## ▶ 3. Computer determined randomness

In case of large population the data are fed in the computer to obtain a random number of elements corresponding to the elements in the population.

Advantage– easier to adopt when computer facilities are available

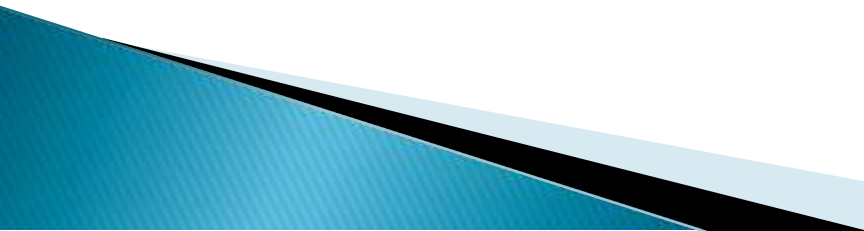
**Part of a  
Table of Random Numbers**

61424	20419	86546	00517
90222	27993	04952	66762
50349	71146	97668	86523
85676	10005	08216	25906
02429	19761	15370	43882
90519	61988	40164	15815
20631	88967	19660	89624
89990	78733	16447	27932

# Advantages of simple random sampling

1. The sample is representative of the population
2. The investigators do not need to know the true composition of the population before hand
3. Sample theoretically reflects all important characteristics and segments of the population.
4. Easiest and simplest technique.
5. Sampling error easily be assessed.

## Disadvantages

1. Doesn't ensure that elements which exist in small number in the population will be included in the given sample.
  2. Quality of representativeness from different segments of population may be hampered, therefore, sampling error may be increased
- 

## Stratified Random sampling

Population is divided into two or more non-overlapping strata which may be based upon single criterion like gender or upon a combination of two or more criteria such as gender and graduation, yielding four strata.

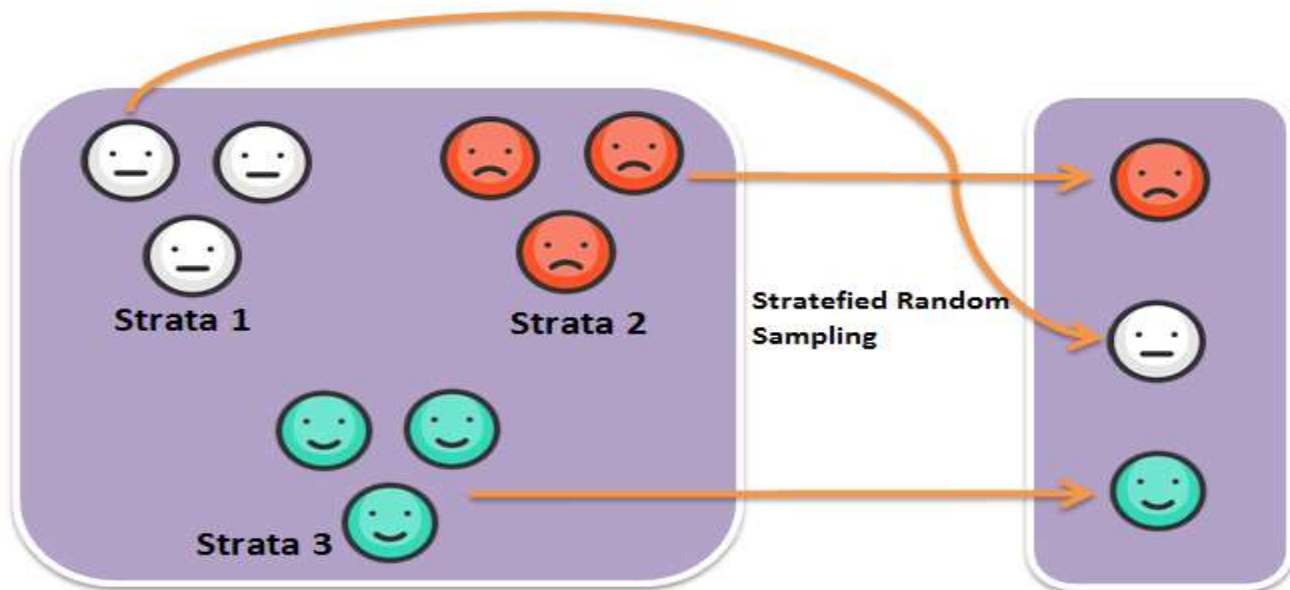
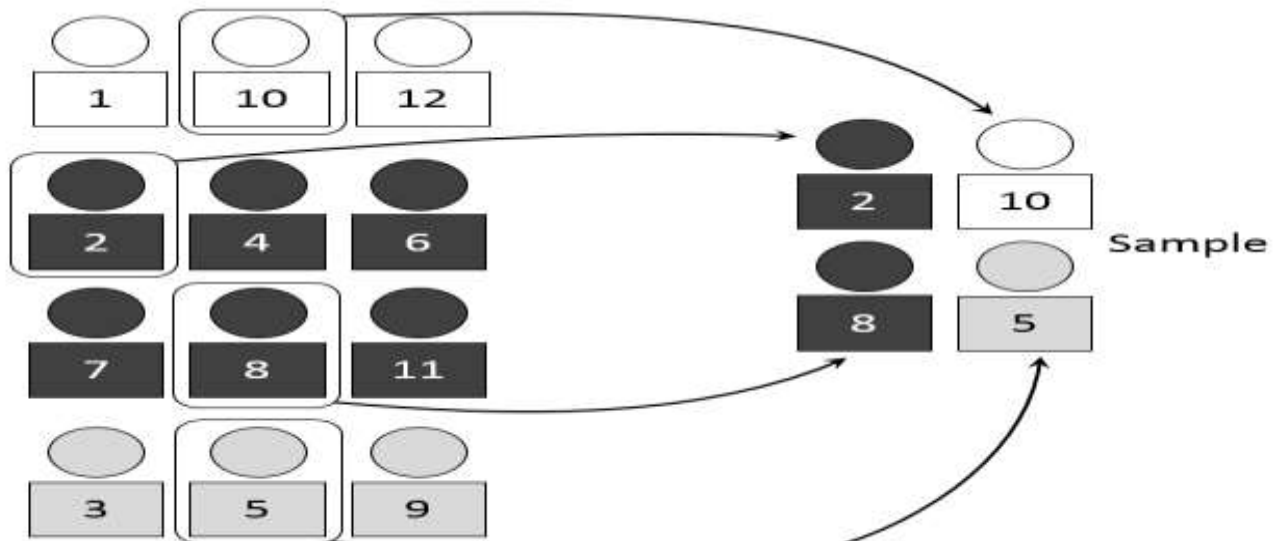
Gender	Undergraduate	Graduate
Boys	Strata 1	Strata 2
Girls	Strata 3	Strata 4

### **Advantages:**

1. Stratification tends to increase the precision in estimating the attributes of the whole population.
2. Different investigators may supervise the sampling survey in each part of the population .
3. It can be used for comparing sub categories.

### **Disadvantages:**

1. It requires more efforts than simple random sampling.
2. It needs a larger sample size as at least 20 persons must be included from each strata for meaningful statistical comparisons.



## Types of stratified random sampling

1. **Proportionate stratified random sampling:-** Randomly draws the individuals from each stratum in a similar proportion as they exist in the population.

Class-wise distribution of a population of 10,000 students

Class	Composition of population	Proportion of each class
BA	6000	0.60
MA	3000	0.30
M Phil	1000	0.10
Total	10,000	1.00

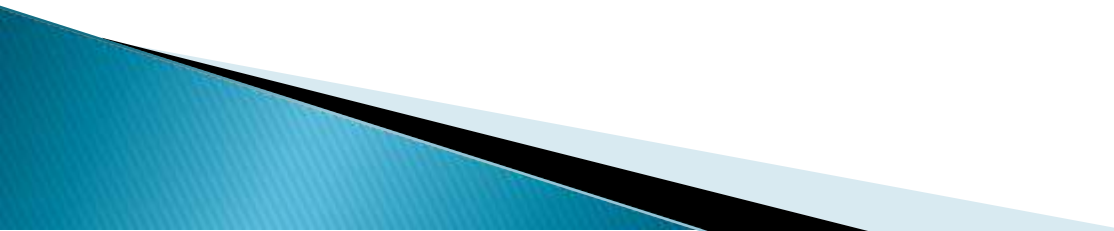
A proportionate breakdown of sample of 1000 students

Class	Sample composition	Class proportion
BA	600 (0.60X1000)	0.60
MA	300(0.30X1000)	0.30
M Phil	100(0.10X1000)	0.10
Total	1000	1.00

## **Advantages:**

1. Sample chosen can represent various groups and patterns of characteristics in the desired proportions.
2. It can be used for comparing various sub categories.
3. Sampling error is less.

## **Disadvantages :**

1. It is a difficult method of determining sample.
  2. It is a time consuming method.
  3. There is the possibility of classification error.
- 

## **2. Disproportionate Stratified random sampling**

Sample unit is not proportionate to the units of the population.

Disproportionate means-

1. either the investigator will give equal weight to each of the strata, or,
2. he will give greater representation to some strata

### **Advantages:**

1. Less time consuming.
2. The investigator may give weight to the particular groups that are not represented as frequently in the population as compared with other groups.

### **Disadvantages:**

1. Certain stratum of population may be over represented or under represented.
- 

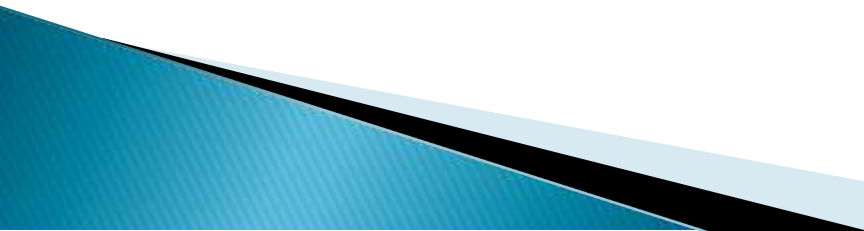
# Systematic (or interval) sampling

Selecting every  $n$ th person from predetermined list of elements or individuals for example selecting every 5<sup>th</sup> roll number in a class of 60 students.

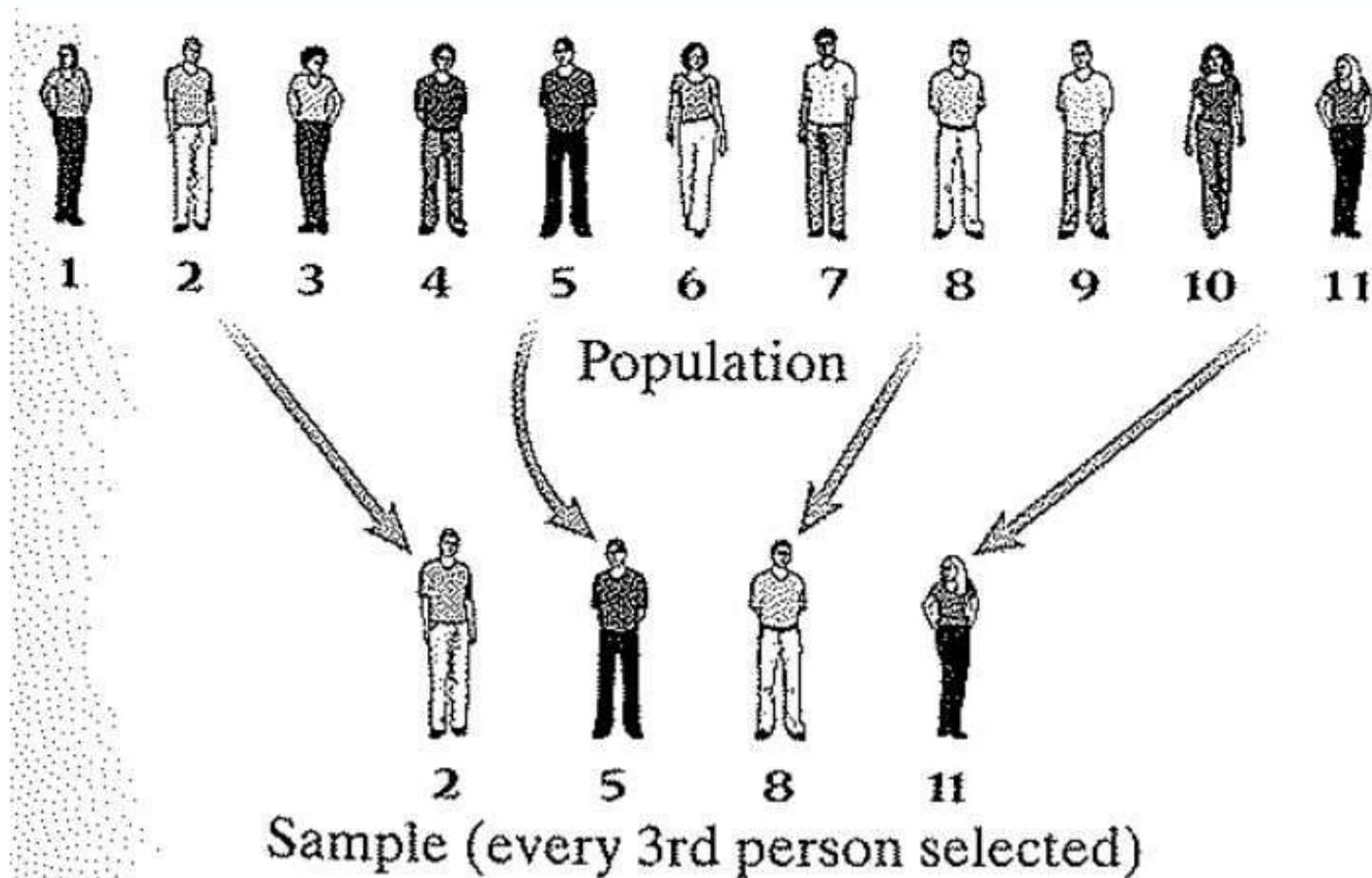
## Advantages:

1. Very easy and rapid method
2. Mistakes in drawing elements are relatively unimportant.

## Disadvantages:

1. It ignores all persons between two  $n$ th numbers
  2. Since each element has no chance of being selected in the group, it is not probability random sampling (Black and Champion, 1976)
  3. Sampling error increases if the list is arranged in a particular order.
- 

# Systematic Sampling



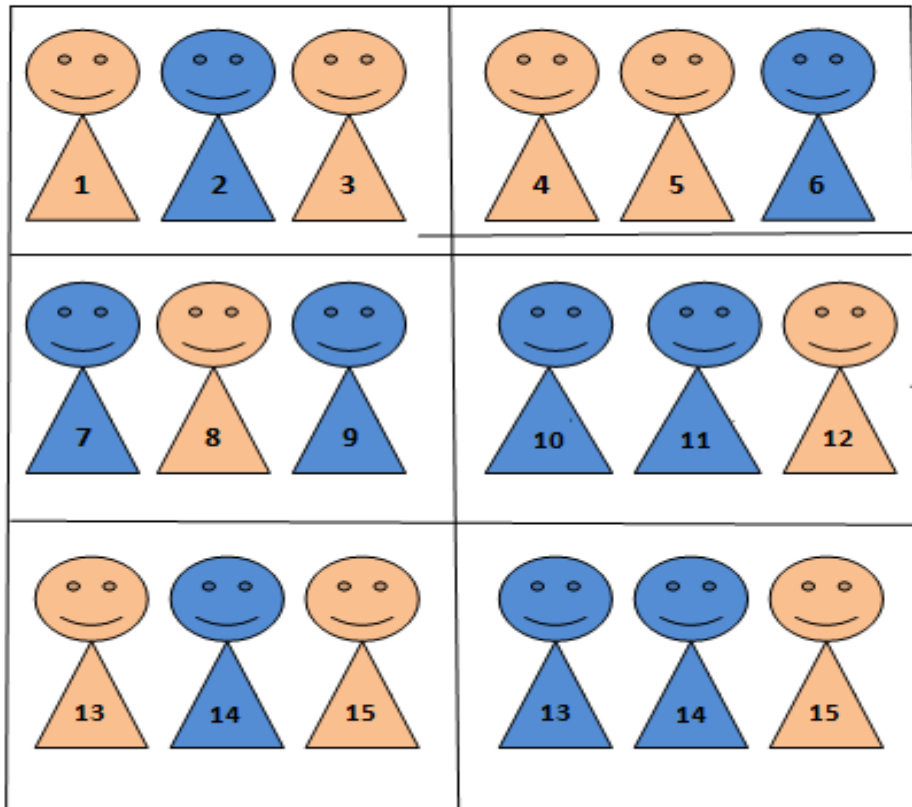
# Cluster or Area Sampling

If the total area of interest happens to be a big one, a convenient way is to divide the area into a number of smaller non-overlapping areas and then to randomly select a number of these smaller areas (usually called cluster) with the ultimate sample consisting of all (or samples of) units in these small areas or clusters. For example suppose we want to estimate the proportion of machine parts which are defective. Suppose 20000 machine parts are stored in 400 cases of 50 each. Thus 400 cases are clusters here and investigator randomly select  $n$  cases and examine all the machine parts in each randomly selected case.

If clusters happen to some geographical subdivisions like divisions of territory, states, cities, community, neighborhood, etc. it is called area sampling. Initial cluster are called primary sampling unit, clusters within the primary cluster are called secondary sampling units and clusters within the secondary sampling units are called multi stage clusters. For example dividing one city into wards, each ward into areas, each area into neighborhood, each neighborhood into lanes.

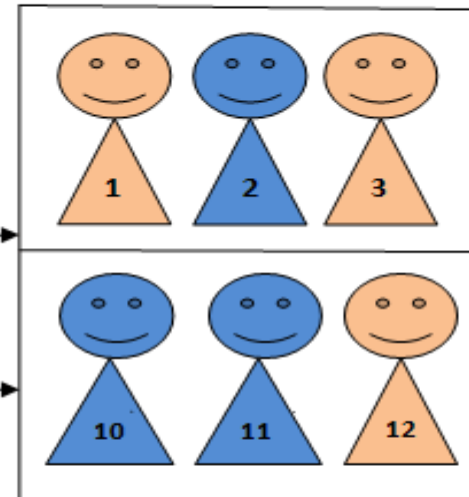
## Population

Clusters



## Sample Group

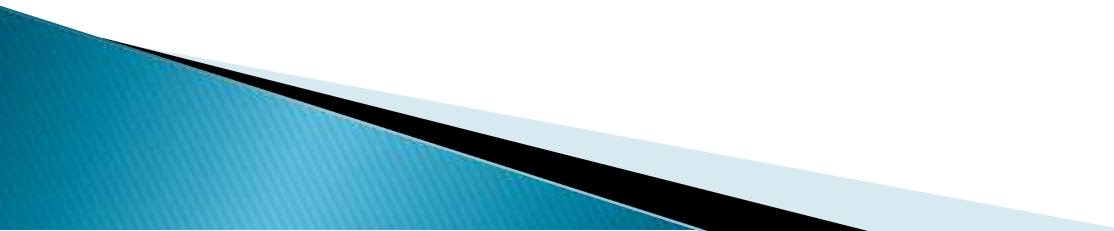
(2 Clusters)



## **Advantage**

1. Easier to apply to large population
2. Less costly and less time consuming
3. More flexible
4. Characteristics of clusters can be estimated

## **Disadvantages**

1. Researcher has little control over the size of each cluster.
  2. Sampling error is greater.
  3. Same individual can belong to two clusters and studied twice.
- 

Thank you

