SAMPLE AND SAMPLING

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SAMPLE

- **Sample:** Sample is a relatively small group of selected number of individuals of objects or cases from a particular population and used to throw light on the population characteristics. It is any part of population.

- **Random Sample:** Sample chosen and selected in such a way that every element in the population has an equal opportunity of being included in the sample.

- **Sample Characteristics:** There are two main characteristics: (1) Precision which implies the size of the sample (2) Unbiased Character

- **Size of the Sample:** To get accurate result and for convenience in applying biostatistical methods, the size of the sample should neither too big nor too small.

SAMPLING

- In biological experiment ,it is rarely possible to collect complete information about a population. So, only few items are selected from the population in such a way that they represent the population.

- Such a section of the population is SAMPLE and the selection of a part of a population to represent the whole population is known as sampling.

- Prof. Chou states "Sampling is a simple process of learning about the population on the basis of a sample drawn from it.

- Individuals or items of a population are known as sampling units. Sampling is a device which makes one to be able to draw inferences about the whole population simply by observing or measuring a few of the sampling units.

Sampling

- Objectives of sampling:

(1) Estimation of population, parameters (mean, proportion etc.) from the sample statistics

(2) To test the hypothesis about the population from which the sample or samples are drawn

- Essentials of Sampling:

1. Selected samples from the population should be homogenous and should not have any difference when compared with the population.

2. The number of observations included in a sample should be more to make the results more reliable.

3. The selected sample should have the similar characteristics as the original population which it has been selected.

Merits and Demerits of Sampling

- Merits :

a) In case of a large population or infinite population , sampling is the only method which can be used.

b) Sampling method reduces the cost of experiment because only a few selected items are studied in sampling.

- Demerits:

a) The result my be false, inaccurate and misleading of the sample has not drawn properly.

b) These may be personal bias with regard to the choice of technique and drawing of sampling units.

Although, there are shortcomings in the sampling techniques yet, it is a very useful method for biostatistical investigation. According to F F Stephen " Samples are like medicines. They can harm only when they are taken carelessly."

Methods of Sampling

The proper methods of selection of samples and the relation between the sample and population is the matter of the " Theory of Sampling".

There are some common methods of sampling:

1. Simple random sampling
2. Stratified sampling
3. Systematic sampling
4. Cluster sampling
5. Non-random sampling

❖ SIMPLE RANDOM SAMPLING: A random sample is a sample where each item of the population has an equal chance of being included in the sample. Random sampling means selection should be without deliberate discrimination. But in practice ,it is very difficult but not impossible.

In random sampling or for randomness, following two methods may be adopted (A) Lottery method (B) Table of random number method

Simple Random Sampling

A. Lottery Method: This is the simplest and most popular method of selecting a sample from a finite population. In this method . All items of population are numbered on separate slips of identical shape, size and color. These slips are shuffled and a blind fold selection is made.

B. Table of Random Number method: If the population size is very large, the application of lottery method becomes difficult. There is a tendency to use a table of random numbers for drawing the samples.

One can use the table of random numbers from any position either horizontally or vertically. A suitable way to choose a starting point is to put a pencil blindly on some number and starting from this point.

Merits and Demerits of Random Sampling
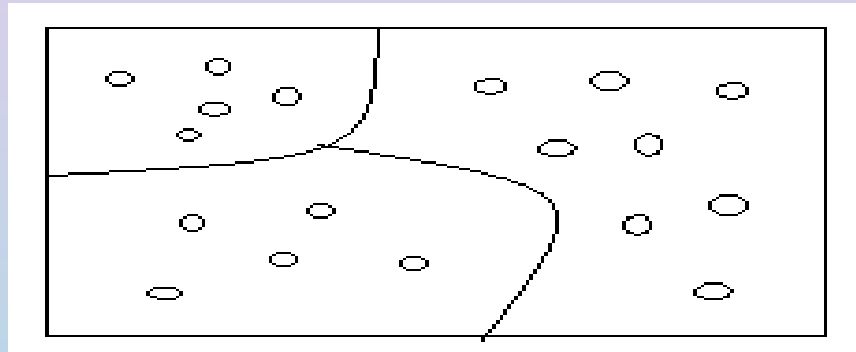
Merits:

- It is more scientific because there are less chances for personal bias in sampling.

- Sampling error can be measured.

- Randomness is essential in the field of life science research if the sample is random.

- The method is economical saving time , money and extra labour.

Demerits:

- Random method sampling requires a complete list of all the items of the population.

- If the size of the sample is small, it will not be true representative of population.

- If the units of the population are spread over a larhe area, this method can not be used.

Stratified Sampling

This method is followed when population is not homogenous. The population under study is first divided into homogenous groups or classes called STRATA and the sample is drawn from each stratum at random in population to its size.

In a population, age group 0-5, 5-15, 15-40 ,40-60 ,above 60 may be strata in another way , 0-5,5-10, 10-15, 15-20, 20-25, ……….may be different strata .

Merit of stratified sampling: Proportionate representative sample from each group is secured and it gives greater accuracy.

Systematic Sampling

It is usually applied to field studies when the population is large, scattered and not homogenous. Systematic procedure is followed to choose a ample by taking every K^{th} individual where K^{th} = sample interval which is calculated by the formula

$$K = \frac{Total\ population}{Sample\ size\ desired}$$

e.g. 10% 0f the sample is to be taken from 1000 individuals.

$$K = \frac{Total\ population}{Sample\ size\ desired} = \frac{1000}{10\%\ of\ 1000} = \frac{1000}{100} = 10$$

If we start from the sample 7, then the sample will consists of units with sample number 7, 7+10 =17, 17+10=27, 27+10 =37, ……and so on.

Merits:

- This sampling method is simple and convenient to adopt.
- The time and labour involved in the collection of sample is relatively small.
- For infinite, homogenous and numbering the unit, this method can be accurate result.

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Cluster Sampling

A cluster is randomly selected group . This method is used when units of population are natural groups such as schools, schools of the area, hospital ward, slums of a town etc.
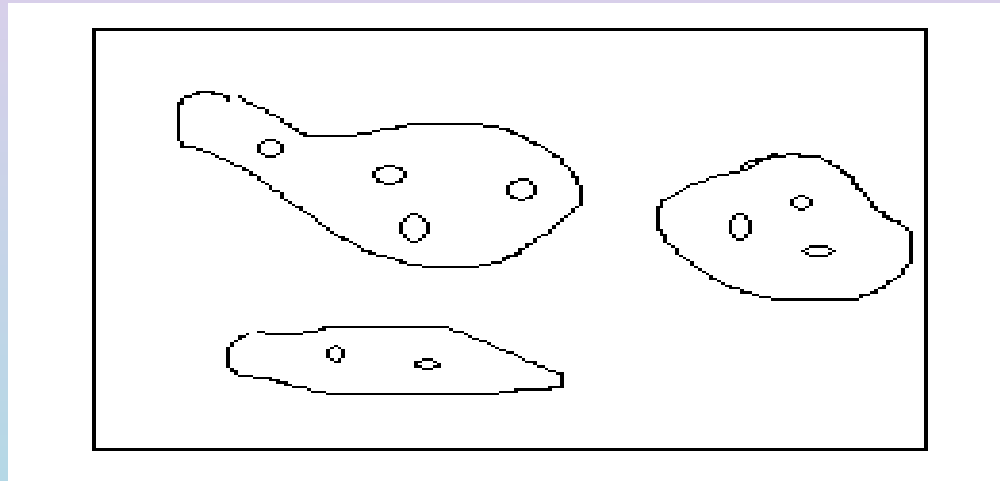
As per module approved by WHO, it is most often used to evaluate vaccination .

Non-Random Sampling

The methods are those which do not provide every item in the universe with a known chance of being included in the sample. The selection process is partially exclusively on the judgement of the investigator .

CONCLUSION

The different methods discussed above can be used in different situations, wherever they are appropriate. However ,it is difficult to say that a particular sampling method would be always be better than the rest . No one method can be regarded as the best under all all circumstances.

Suggested Readings

- Selvin S (2007). Biostatistics how it Works. Pearson Education.

- Mahajan BK (1999) .Methods in Biostatistics. Jaypee Brothers, New Delhi.

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- Prasad S (2007). Elements of Biostatistics. Rastogi Publications, Meerut.