## **Frequently Asked Questions**

1. Define a sample.

**Answer:** A finite subset of the population selected from it with the objective of investigating its properties is called a sample. But the sample selected should represent the population. Hence, a sample is a representative portion of the population.

2. Write a note on representative sample.

samples based on its size and randomness.

**Answer:** Although the term representativeness has no precise scientific meaning, it carries a common sense meaning that makes it useful in sampling theory. Sample is a representative of the population from which it is selected if the aggregate characteristic of the sample closely approximate those same aggregate characteristics in the population. If for example the population contains 50% women and the sample must contain " close to" 50% women to be representative. Note that the samples need not be representative in all respects. Representativeness is limited to those characteristics that are relevant to the substantive interest of the study. However, we may not know in advance which characteristics are relevant. Following laws guarantees the representativeness of the

3. What are the main objectives for the selection of the samples?

**Answer:** The main objectives for the selection of the samples are

- i. To obtain the optimum results i.e., the maximum information about the characteristics of the population with the available sources at our disposal in terms of time, manpower, and money by studying the sample values only.
- ii. To obtain the best possible estimates of the population parameters with limited resources
- 4. Why do we need samples?

**Answer:** Samples are needed in practice for variety of reasons such as:

Sampling can save time and money. A sample study is usually a less expensive than enumeration of the entire population and produces results at a relatively faster speed.

Sampling may enable more accurate measurements for a sample study is generally conducted by trained and experienced investigators

> We have to go for the selection of samples when the population consists of infinitely many members.

Sampling remains the only choice when the test involves the destruction of the item under study.

Sampling usually enables to estimate sampling errors and thus assists in obtaining information concerning some characteristics of the population.

5. Briefly explain the essentials of samples.

**Answer:** A few essentials of samples are:

- Adequacy: The size of the sample should not be very small. It should be adequate enough to represent the universe completely
- Independent selection: All the items of the sample must be selected independently of one another and all the items of the universe must have an equal chance of being selected in the sample
- Homogeneity: There should be no basic difference in the nature of units of the population and that of the sample. If two samples from the same population are taken, they should be more or less similar.
- Representative: A sample should be so selected that it truly represents the population otherwise the results obtained may be misleading to ensure this selection of sample must be random

6. Write a note on the size of the sample.

**Answer:** The number of units, which constitute a sample, is known as a sample size. One crucial aspect of study design is deciding how big your sample should be. If you increase your sample size you increase the precision of your estimates, which means that, for any given estimate / size of effect, the greater the sample size the more "statistically significant" the result will be. The smaller the deference between the population and a sample you regard as important to detect, the greater the sample size required.

Factors such as time, cost, and how many subjects are actually available are the constraints that often have to be taken account when designing a study. However, these factors should not dictate the sample size. There is no point in carrying out a study that is too small, only to come up with results that are inconclusive, since you will then need to carry out another study to confirm or refute your initial results.

7. What are the two approaches to sample size calculations?

**Answer:** There are two approaches to sample size calculations. They are Precision based approach and power based approach.

- Precision-based: With what precision do we need to estimate the population parameters
- Power-based: How small a deference is it important to detect and with what degree of certainty?

8. Explain the relationship between a population and a sample.

**Answer:** In Statistics, population is the aggregate of objects, animate or inanimate, under study in any statistical investigation." In sampling theory, the population means a larger group from which the samples are drawn. Based on sample study we can predict and

generalize the behaviour of the mass of phenomena. This is possible because there is no statistical population whose elements would vary from each other without limit.

However, sample is a subset of the population and it represents the population. Sample represents the population in terms of its characteristics and the size of the population.

9. Give examples for biased samples.

**Answer:** Consider a situation where the Congress is debating some gun control laws. We are asked to conduct an opinion survey. Because hunters are the ones that are most affected by the gun control laws, we went to a hunting lodge and interviewed the members there. Then we reported that in a survey done by us 97% of the respondents were in favour of repealing all gun control laws.

A week later Congress took up another bill " Should working pregnant women be given a maternity leave of one year with full pay to take care of new born babies?" Because this issue affects women most, this time we went to all high-rise office complexes in our city and interviewed several working women of child- bearing age. Again we reported that in a survey done by us about 93% of the respondents were in favour of the one year maternity leave with full pay.In both these situations, we picked a biased sample by choosing people who would have very strong feelings on one side of the issue. This way of selection of samples may lead to disastrous results in decision-making process.

10. When do we go for the selection of a sample?

Answer

- Sampling remains the only way when the population consists of infinitely many members.
- Sampling remains the only choice when the test involves the destruction of the item under study.

11. Distinguish between sample size and a population size.

**Answer:** The number of units in the mass, which constitutes a population under study, is known as size of the population. Population size may be finite or infinite. Whereas, the number of units in the part of the population which constitutes a sample is known as a sample size. A sample size is always finite and less than the population size. Algebraically the population size is denoted by "N" and the sample size by "n".

12. How do you test the reliability of the sample?

**Answer:** The reliability of samples can be tested in the following ways.

- More samples of the same size should be taken from the same population and results be compared. If results are similar, the sample will be reliable.
- If the measurements of the universe are known then they should be compared with the measurements of the sample. In case of similarity of measurements, the sample will be reliable.
- Sub-sample should be taken from the samples and studied. If the results of the sample and sub -sample shoe similarity the sample should be considered reliable

13. How do you approximate sample sizes based on the population size? **Answer:** 

- The bigger the population: It is better up to 2500. Beyond 2500, it doesn't really matter because accuracy increases very slowly after this point
- > The smaller the population: The bigger the sampling ratio that is needed.
- > For populations of size under 1000: You need sampling ratio of
- > 30% (300 elements) to be accurate.
- > For populations of about 10,000: Need sampling ratio of about 10%

## 14. What do you mean by Law of statistical Regularity?

**Answer:** In words of L.R. Conner, "The Law of statistical Regularity lays down that a group of objects Chosen at random from a large group are almost sure on the average to possess the characteristics of the large group".

According to King "The Law of statistical Regularity lays down that a moderately large number of items chosen at random from a large group are almost sure on the average to possess the characteristic of their large group".

15. Give two examples to illustrate the concept of Population and sample.

**Answer:** Suppose that a personnel director of a large bank need to write a report describing all the employees who have voluntarily left the company in the last 10 years. We would have a difficult task locating all these thousands of people. They are not easily accessible as group- Many have died, moved from community, left the country or acquired a new name by marriage. The best idea to write the report is to locate few employees who have voluntarily left the company in the last 10 years and interview them in order to generalize about the entire group. Consider an automatic machine that sorts thousands of pieces of mails daily to check whether the machine is working accurately. Few mails can be taken at specific intervals of time in a day and if necessary, the machine can be adjusted right away. We use sampling when it is not possible to count or measure every item in the population. In the above cases the populations are all, all the employees of the large bank who voluntarily left in the last 10 years, and all mails sorted by the automatic machine. The samples are selected employees of the large bank who voluntarily left in the last 10 years and selected mails sorted by the automatic machine at a specific intervals of time.