Frequently Asked Questions

1. Distinguish between Biased errors and unbiased errors.

Answer:

Biased errors: These errors arise from any bias in selection, estimation etc. For example if in place of Simple Random Sampling, Deliberate Sampling has been used in a particular case some bias has been introduced in the result and hence such errors are called biased sampling errors.

Unbiased errors: These errors arise due to chance. That is the differences between the members of the population included in the sample and those not included.

2. Distinguish between cumulative and noncumulative errors.

Answer:

The total sampling error is made up of errors due to bias if any and the random sampling error. The essence of bias is that it forms a constant component of error that does not decrease in a large population as the number in the sample increases. Such errors are also known as cumulative and non compensating error. The random sampling error on the other hand decreases on an average as the size of the sample increases. Such errors are also known as non cumulative or compensating error.

3. When the bias due to under coverage occurs? Explain

Answer:

Under coverage occurs when some members of the population are inadequately represented in the sample. A classic example of under coverage is the *Literary Digest* voter survey, which predicted that Alfred Landon would beat Franklin Roosevelt in the 1936 presidential election. The survey sample suffered from under coverage of low-income voters, who tended to be Democrats.

This happened because the survey relied on a <u>convenience sample</u>, drawn from telephone directories and car registration lists. In 1936, people who owned cars and telephones tended to be more affluent. Under coverage is often a problem with convenience samples.

4. When do you say that the faulty selection of the sample has occurred?

Answer:

- a) Deliberate selection of representative sample
- b) Conscious and Unconscious bias in the selection of a "random sample". The randomness of selection may not really exist even though the investigator claims that he had a random sample if he allows his desire to obtain a certain result to influence his selection
- c) Substitution: Substitution of an item in place of one chosen in random sample sometimes leads to bias. Thus if it were decided to interview the 51st or any other number in any place as the characteristics possessed by them differ from those who were originally to be included in the sample.
- d) Non response: If all the items to be included in the sample are not covered there will be bias even though no substitution has been attempted.
- 5. Briefly explain Voluntary response bias.

Answer:

Voluntary response bias occurs when sample members are self-selected volunteers, as in <u>voluntary samples</u>. An example would be call-in radio shows that solicit audience participation in surveys on controversial topics (abortion, affirmative action, gun control, etc.). The resulting sample tends to over represent individuals who have strong opinions.

6. What is Response bias? Give example.

Answer:

Response bias refers to the bias that results from problems in the measurement process. Some examples of response bias are given below:

- Leading questions. The wording of the question may be loaded in some way to unduly favor one response over another. For example, a satisfaction survey may ask the respondent to indicate where she is satisfied, dissatisfied, or much dissatisfied. By giving the respondent one response option to express satisfaction and two response options to express dissatisfaction, this survey question is biased toward getting a dissatisfied response
- Social desirability. Most people like to present themselves in a favourable light, so they will be reluctant to admit to unsavoury attitudes or illegal activities in a survey, particularly if survey results are not confidential. Instead, their responses may be biased toward what they believe is socially desirable

7. What are sampling errors? Explain.

Answer:

A survey produces a sample statistic, which is used to estimate a population parameter. If we repeat a survey many times, using different samples each time, we might get a different sample statistic with each replication giving rise to varied estimates for the *same* population parameter.

If the statistic is unbiased, the average of all the statistics from all possible samples will equal to the true population parameter; even though any individual statistic may differ from the population parameter. But there will be variability among statistics from different samples which is called as sampling error. Sampling Error is an error due to inappropriate selection of sample size. It can be minimized by choosing the appropriate sample size. As the sample keeps on increasing, the sampling error decreases.

For example: Population mean (μ) gross income = \$42,300

Sample 1: A sample with 400 units gives the mean income = \$41,100

Sample 2: Another sample of the same size gives the mean income = \$43,400

8. What are the typical problems of sampling?

Answer:

Typical Problems of sampling are:

- Sample is of insufficient size: means that you weren't very clever or scientific when you defined the sample
- The sample is biased: Due to selection bias or response bias the sample is biased. Often biases can be subtle and can take time to find and correct. Control samples are usually not an adequate substitute as they be biased as well
- The wrong variables were measured: Actual variables required for the study were not collected or not available, then the wrong variables were measured the collected data are measuring secondary effects not primary effects
- The sample is censored: When it is impossible to go for a sample as there exists a population which is below the threshold of our measuring technique or apparatus, the sample is censored
- The data precision is low: The collected information is at low level of precision then we have only low signal-to-noise results

9. Write a note on sampling frame error.

Answer:

Sampling frame errors is the specific list of population units, from which the sample for a study is being chosen. Example: Assume that a bank wants to contact the people belonging to a particular profession over phone to market a home loan product. The sampling frame in this case is the telephone directory. This sampling frame may pose several problems:1) People might have migrated. 2) Numbers have changed. 3) Many numbers were not yet listed. Residents who are included in the directory are likely to differ from those who are not included.

Firstly, the record of 1998 cannot be used for 2008 or 09 as it becomes outdated that not to date. Secondly the name and addresses mentioned are often inappropriate and the duplication of elements also occurs. Thirdly there is no record of those who has left an area and those who has come to live here.

10. What are Non response errors?

Answer:

The two major non response issues in sampling are improving response rates and adjusting for non response. Non response error arises when some of the potential respondents included in the sample do not respond.

The primary causes of low response rates are refusals and not-at-homes. Refusals, which result from the unwillingness or inability of people included in the sample to participate, result in lower response rates. The detection and measurement of non coverage are difficult. With non response the most important consequences is that estimates may become biased because the part of the population that is not reached may differ from the part that is sampled. There is now ample evidence that these biases vary considerably from item to item and from survey to survey being sometimes negligible and sometimes large. A second consequence is of course that the variances of estimates are increased because the sample actually obtained is smaller than the target sample. This factor can be allowed or at least approximately in selecting the size of the sample.

11. What do you mean by errors of measurement?

Answer:

A poor measurement process can also lead to troubles. In survey research, the measurement process includes the environment in which the survey is conducted, the way that questions are asked, and the state of the survey respondent. Errors of measurement that are independent from unit to unit within the sample and average to zero over the whole population are properly taken into account in the usual formulae for computing the standard errors of the estimates provided that finite population correction terms are negligible. Such errors decrease the precision of the estimates and it is worthwhile to find out whether this decrease is serious. If errors of measurement on different units in the sample are correlated the usual formulae for the standard errors are biased. The standard errors are likely to be too small since the correlations are mostly positive in practice. This type of disturbance is easily overlooked and may often have passed unnoticed.

12. What do you mean by sampling bias?

Answer:

Sampling Bias are the errors resulting from taking a non-random sample of a population

- Based on sampling method used, some members of a population are less likely to be included in the sample.
- Reduces the ability for results to be generalized to a larger population.

- More often, sampling bias occurs because of the inherent difficulty in obtaining a truly representative sample of a complex population.
- 13. What are the different types of sampling bias?

Answer:

Different types of sampling bias are

1. Selection from only a specific area of the population (intentional ("purposive"), or accidental "convenience sample")

- Biased if certain members are under-represented or overrepresented relative to others in the population being generalized to
- 2. Self-selection bias
 - Participants' decision to participate may be correlated with traits that affect the study, making the participants a non-representative sample.
- 3. Pre-screening of or advertising for volunteers within particular groups.
 - May also include selecting only from certain kinds or groups of subjects in order to intentionally skew the sample toward a certain desired trait or characteristic.
 - People who have strong opinions or substantial knowledge may be more willing to spend time answering a survey than those who do not.
 - Online and phone-in polls, which are biased samples because the respondents are self-selected. This means that people with strong opinions are more likely to respond to the poll than people who have less strong opinions.

14. How can we reduce the refusal rates in sampling? **Answer:**

We can attempt to reduce the refusal rates by adopting the following strategies

- 1. Prior notification Potential respondents are sent a letter notifying them of the imminent mail, telephone, personal or internet survey.
- 2. Motivating the respondents The interviewer starts with a small request such as 'Will you please take five minutes to answer five questions?' which is followed by a larger request (foot-in-the-door strategies). In the reverse strategy, the initial request is relatively large, followed by a smaller request (door-in- the-face strategy).
- 3. Incentives Offering monetary as well as nonmonetary incentives to potential respondents.

15. Which of the following statements are true? Give reason.

I. Random sampling is a good way to reduce response bias.

II. To guard against bias from under coverage, use a convenience sample.

III. Increasing the sample size tends to reduce survey bias.

IV. To guard against non response bias, use a mail-in survey.

Answer:None of the above statements is true.

- I. <u>Random sampling</u> provides strong protection against bias from <u>under coverage</u> bias and <u>voluntary response bias</u>; but it is not effective against <u>response bias</u>
- II. A <u>convenience sample</u> does not protect against under coverage bias; in fact, it sometimes causes under coverage bias.
- III. Increasing sample size does not affect survey bias.
- IV. And finally, using a mail-in survey does not prevent <u>non response bias</u>. In fact, mailin surveys are quite vulnerable to non response bias.