Sampling Error

Sampling error is the deviation of the selected sample from the true characteristics, traits, behaviors, qualities or figures of the entire population.

Why Does This Error Occur?

Sampling process error occurs because researchers draw different subjects from the same population but still, the subjects have individual differences. Keep in mind that when you take a sample, it is only a subset of the entire population; therefore, there may be a difference between the sample and population.

The most frequent cause of the said error is a biased sampling procedure. Every researcher must seek to establish a sample that is free from bias and is representative of the entire population. In this case, the researcher is able to minimize or eliminate sampling error [1].

Another possible cause of this error is chance. The process of randomization [2] and probability sampling [3] is done to minimize sampling process error but it is still possible that all the randomized subjects are not representative of the population.

The most common result of sampling error is systematic error [4] wherein the results from the sample differ significantly from the results from the entire population. It follows logic that if the sample is not representative of the entire population, the results from it will most likely differ from the results taken from the entire population.

Sample Size and Sampling Error

Given two exactly the same studies, same sampling methods, same population, the study with a larger sample size will have less sampling process error compared to the study with smaller sample size. Keep in mind that as the sample size increases, it approaches the size of the entire population, therefore, it also approaches all the characteristics of the population, thus, decreasing sampling process error.

Sampling Error and Sample Size

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Standard Deviation and Sampling Error

Standard deviation [5] is used to express the variability of the population. More technically, it is the average difference of all the actual scores of the subjects from the mean [6] or average of all the scores. Therefore, if the sample has high standard deviation, it follows that sample also has high sampling process error.

It will be easier to understand this if you will relate standard deviation with sample size. Keep in mind that as the sample size increases, the standard deviation decreases.

Imagine having only 10 subjects, with this very little sample size, the tendency of their results is to vary greatly, thus a high standard deviation. Then, imagine increasing the sample size to 100, the tendency of their scores is to cluster, thus a low standard deviation.

Ways to Eliminate Sampling Error

There is only one way to eliminate this error. This solution is to eliminate the concept of sample, and to test the entire population.

In most cases this is not possible; consequently, what a researcher must to do is to minimize sampling process error. This can be achieved by a proper and unbiased probability sampling and by using a large sample size.

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Links
[1] http://en.wikipedia.org/wiki/Sampling_error
[2] https://staging.explorable.com/randomized-controlled-trials
[3] https://staging.explorable.com/probability-sampling
[4] https://staging.explorable.com/systematic-error
[5] https://staging.explorable.com/measurement-of-uncertainty-standard-deviation
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