Sample size

Sample Size Calculation

Introduction to sample size

Do you want to know how to determine the appropriate sample size, minimize the margin of error, and generate surveys with statistically significant results? This brief guide will outline ways to improve your surveys and highlight some of the available tools and resources you can use. Initially, when conducting any research, it's important to determine how many participants you need in order to obtain results that accurately reflect the target population and meet your desired level of confidence.

However, if you are unfamiliar with this concept, let's begin by defining what sample size means

What is sample size?

The term "sample size" refers to the number of participants in a survey, study, or experiment in research.

When dealing with large populations, determining the right sample size is crucial. This is because it is not feasible to gather information or results from every individual, so instead a random sample of participants is selected to represent the entire population.

For instance, consider a scenario where we want to compare the performance of long-distance runners who eat Weetabix for breakfast versus those who don't. As it is impractical to survey the breakfast habits of all long-distance runners worldwide, we would have to focus on a subset of the population. This could involve choosing 1,000 runners for the study.

How can sample size influence results?

That said, no matter how diligent we are with our selection, there will always be some margin of error (also referred to as confidence interval) in the study results, that's because we can't speak to every long-distance runner or be confident of how Weetabix influences (in every possible scenario), the performance of long-distance runners. This is known as a "sampling error."

Larger sample sizes will help to mitigate the margin of error, helping to provide more statistically significant and meaningful results. In other words, a more accurate picture of how eating Weetabix can influence the performance of long-distance runners.

So what do you need to know when calculating the minimum sample size needed for a research project?

What you need to know to calculate survey sample size

Confidence interval (or margin of error)

The confidence interval is the range of values that represents the level of accuracy of the reported results. For instance: A nationwide survey in Canada investigated the spending habits for Mother's Day. The results showed that 82% of Canadians planned to buy gifts for their mother, compared to 20% for their spouse and 15% for their mother-in-law. In terms of

expenditures, Canadians estimated spending $93 on their spouse and $58 on their mother. The accuracy of the national findings is within a range of plus or minus 2.75%, with a confidence level of 19 out of 20.

For example, if you use a confidence interval of 2.75 and 82% percent of your sample indicates they will "buy a gift for mom" you can be "confident (95% or 99%)" that if you had asked the question to ALL CANADIANS, somewhere between 79.25% (82%-2.75%) and 84.75% (82%+2.75%) would have picked that answer.

Confidence interval is also called the "margin of error." Are you needing to understand how the two calculations correlate?

Confidence level

The confidence level tells you how confident you are of this result. It is expressed as a percentage of times that different samples (if repeated samples were drawn) would produce this result. The 95% confidence level means that 19 times out of twenty that results would fall in this - + interval confidence interval. The 95% confidence level is the most commonly used.

When you put the confidence level and the confidence interval together, you can say that you are 95% (19 out of 20) sure that the true percentage of the population that will "buy a gift for mom" is between 79.25% and 84.75%.

Wider confidence intervals increase the certainty that the true answer is within the range specified. These wider confidence intervals come from smaller sample sizes. When the costs of an error is extremely high (a multi-million dollar decision is at stake) the confidence interval should be kept small. This can be done by increasing the sample size.

Population size

Population size is the total amount of people in the group you're trying to study. If you were taking a random sample of people across the U.K., then your population size would be just over 68 million (as of 09 August 2021).

Standard deviation

This refers to how much individual responses will vary between each other and the mean. If there's a low standard deviation, scores will be clustered near the mean with minimal variation. A higher standard deviation means that when plotted on a graph, responses will be more spread out.

Standard deviation is expressed as a decimal, and 0.5 is considered a "good" standard deviation to set to ensure a sample size that represents the population.

How can you calculate sample size?

After you've considered the four above variables, you should have everything required to calculate your sample size.

However, if you don't know your population size, you can still calculate your sample size. To do this, you need two pieces of information: a z-score and the sample size formula.

What is a z-score?

A z-score is simply the numerical representation of your desired confidence level. It tells you how many standard deviations from the mean your score is.

The most common percentages are 90%, 95%, and 99%.

$$z = (x - \mu) / \sigma$$

As the formula shows, the z-score is simply the raw score minus the population mean and divided by the population's standard deviation.

Using a sample size calculation

Once you have your z-score, you can fill out your sample size formula, which is:

$$\text{Necessary Sample Size} = \frac{(Z\text{-score})2 \times \text{StdDev} \times (1\text{-StdDev})}{(\text{margin of error})2}$$

Online sample size Calculation.

If you desire a more convenient solution, an online sample size calculator that can assist you in determining the appropriate sample size for your survey in mere seconds. Simply input the required parameters such as confidence level, population size, and margin of error, and the calculator will instantly compute the ideal sample size for you.

For more notes click on:
www.physiotherapyphd.com