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In statistics, Slovin's formula is used to calculate the minimum sample sized needed to estimate a statistic based on an acceptable margin of error. Slovin's formula is calculated as: $n = N / (1 + Ne/2)$ where: n: Sample size needed N: Population size e: Acceptable margin of error The following examples show how to use Slovin's formula in practice.

Example 1: Using Slovin's Formula to Estimate Population Proportion Suppose a lawyer wants to estimate the proportion of individuals in a certain neighborhood that are in favor of a new law. Suppose he knows there are 10,000 individuals in this neighborhood and it would take far too long to survey each individual, so he would instead like to take a random sample of individuals. Assume that he would like to estimate this proportion with a margin of error of .05 or less. He can use Slovin's formula to figure out the minimum number of individuals he must include in his sample: $n = N / (1 + Ne/2) = 10,000 / (1 + 10,000(0.05)/2) = 384.615$ To be conservative, the lawyer should round up to the nearest integer and include 385 individuals in his sample. Example 2: Using Slovin's Formula to Estimate Population Mean Suppose a botanist wants to estimate the mean height of a certain species of plant in some region. Suppose she knows there are 500 of these plants in the region and it would take far too long to measure each individual plant, so she would instead like to take a random sample of plants. Assume that she would like to estimate this mean with a margin of error of .02 or less. She can use Slovin's formula to figure out the minimum number of plants she must include in her sample: $n = N / (1 + Ne/2) = 500 / (1 + 500(0.02)/2) = 416.667$ To be conservative, the botanist should round up to the nearest integer and include 417 plants in her sample. Slovin's Formula: The Relationship Between Sample Size & Margin of Error There is a simple relationship between sample size and margin of error: The lower the margin of error, the larger the sample size needed. To illustrate this, consider the example from earlier when the lawyer wanted to estimate the proportion of individuals in a neighborhood who were in favor of a new law using a margin of error of 0.05. Since the total number of individuals in the neighborhood was 10,000, he used the following formula to calculate the minimum sample size needed for his survey: $n = N / (1 + Ne/2) = 10,000 / (1 + 10,000(0.05)/2) = 384.615$ However, suppose the lawyer instead wanted a margin of error of 0.01. Here is how he would use Slovin's formula to calculate the minimum sample size for this survey: $n = N / (1 + Ne/2) = 10,000 / (1 + 10,000(0.01)/2) = 5,000$ Since the lawyer decreased his margin of error, his sample size increased. This should make sense intuitively. If you want a lower margin of error (i.e. a more accurate estimate) then you must include far more individuals in your sample. Bonus: Feel free to use this Slovin's Formula Calculator to automatically calculate a minimum sample size based on a population size and acceptable margin of error. Additional Resources The following tutorials provide additional information about sampling in statistics: An Introduction to Types of Sampling Methods Population vs. Sample: What's the Difference? The Relationship Between Sample Size and Margin of Error When sampling large populations, use Slovin's formula to determine the necessary sample size. Slovin's formula calculates the required sample size for simple random sampling. The formula uses the total population size and the allowable margin of error to determine how large a sample should be used. Limitations of Slovin's Formula - When it is not possible to study an entire population (such as the population of the United States), a smaller sample is taken using a random sampling technique. Slovin's formula allows a researcher to sample the population with a desired degree of accuracy. Slovin's formula gives the researcher an idea of how large the sample size needs to be to ensure a reasonable accuracy of results. TL;DR (Too Long; Didn't Read) Slovin's Formula provides the sample size (n) using the known population size (N) and the acceptable error value (e). Fill the N and e values into the formula $n = N / (1 + Ne/2)$. The resulting value of n equals the sample size to be used. When to Use Slovin's Formula If a sample is taken from a population, a formula must be used to take into account confidence levels and margins of error. When taking statistical samples, sometimes a lot is known about a population, sometimes a little may be known and sometimes nothing is known at all. For example, a population may be normally distributed (e.Video advice: Practical Research 2 - Sampling and Sampling Techniques, Slovin's Formula Online Sample Size Calculator: Slovin's Formula Calculator) Calculate how many people you survey when using Feedback Polls and Surveys. Try this free sample size calculator to make sure you get accurate results. 2. Confidence level/Confidence level determines how certain you may be of the results. The standard for researching the market is really a 95% level of confidence, meaning should you run the experiment 20 occasions, you'd obtain the same results (inside a certain margin of error) 19 occasions. How a sample size calculator works Sample size calculator How to determine a sample size and other questions answered Running a customer survey and not sure how big your random sample size should be? We'll walk through how to determine your sample size and set up your first survey. What is a sample size? A sample size is a total number of data points collected in a study (e.g., the number of responses to a single survey question). Identifying sample size is key to determining whether data accurately reflects the population as a whole. A larger sample size generally means greater accuracy. What calculator do you use? We're big fans of CXL's brilliant calculator. Check it out here. What is Slovin's Formula? Slovin's formula is used to calculate the sample size necessary to achieve a certain confidence interval when sampling a population. A researcher wants to know the average age of teacher in one city. If there are 250 elementary teachers, 220 secondary teachers and 340 tertiary level teachers in that city, Slovin vs Cochran Well, I'll respond answering for the Slovin(2) formula, even though it's a really bad corruption of the original Cochran's formula (1) which is mathematically much more robust. (see notes below) It is identical to Yamane's formula (3) Note: Yamane/Slovin is an estimator for sample size when proportions (categorical data) are being sampled and should NEVER be used for estimating sample size where ratio (numerical) data such as age or weight are being sampled. This is so wrong on many levels. However - here are the calculations. Video advice: Slovin's Formula (Solving Sample Size given Population) - Statistics Nakatulong ba sa'yo ang video na 'to? You can support the channel in producing better educational content for both students and teachers. You can buy me a coffee here: Summation Notation, Sampling Size and Sampling Techniques Flashcards Start studying Summation Notation, Sampling Size and Sampling Techniques. Learn vocabulary, terms, and more with flashcards, games, and other study tools. Will this sample correlation coefficient be roughly unity? Explain why or why don't you. Verified answer PROBABILITY State whether each statement holds true or false. If false, provide a reason, is one particular occur roster form. Verified answer STATISTICS In general, when confronted with inferences for 2 population proportions, which two terms in this set (18) Statistics Organization and Presentation of Data Measures of Central Tendency Ch. 5 Selecting Research Participants chap 5 ch 7 vocab Research Methods- Chapter 7 Short Story and Its Elements The Nature and Scope of Philosophy of Education idiomst. therese Upgrade to remove ads Only RUB 2.325/year STUDY Flashcards Learn Write Spell Test PLAY Match Gravity Terms in this set (18) Summation (Sigma) Notation is a convenient and simple form of shorthand used to give a concise expression for a sum of the values of a variable. index of summation the variable defined below the 2 is Robert Slovin developed the slovin's formula Slovin's formula used to determine the appropriate number of participants/sample in a survey. Tar Yamane (1967) Some authors claim that the original proponent of the Slovin's formula is a statistician named margin of errors a statistic expressing the amount of random sampling error in a survey's results. Sampling refers to the process of drawing samples from the population or universe. Random Sampling is a process whose members had an equal chance of being selected from the population. * It is also called probability sampling. Simple random sampling is the basic sampling technique where we select a group of subjects (a sample) for study from a larger group (a population). How to Use Slovin's Formula - When it is not possible to study an entire population (such as the population of the United States), a smaller sample is taken using a random sampling technique. Slovin's formula allows a researcher to sample the population with a desired degree of accuracy. It gives the researcher an idea of how large his sample size needs to be to ensure a reasonable accuracy of results. When to Use Slovin's Formula If a sample is taken from a population, a formula must be used to take into account confidence levels and margins of error. When taking statistical samples, sometimes a lot is known about a population, sometimes a little and sometimes nothing at all. For example, we may know that a population is normally distributed (e.g., for heights, weights or IQs), there may be a bimodal distribution (as often happens with class grades in mathematics classes) or we may have no idea about how a population is going to behave (such as polling college students to get their opinions about quality of student life). Video advice: COMPUTING SAMPLE SIZE USING THE SLOVIN'S FORMULA Please don't forget to hit LIKE and SUBSCRIBE! [FAQ] Slovin's formula calculates the number of samples required when the population is too large to directly sample every member. Slovin's formula works for simple random sampling. If the population to be sampled has obvious subgroups, Slovin's formula could be applied to each individual group instead of the whole group. - is used to calculate the sample size (n) given the population size (N) and a margin of error (e). - It is computed as $n = N / (1 + Ne/2)$. Slovin's formula is used to calculate the sample size necessary to achieve a certain confidence interval when sampling a population. This formula is used when you don't have enough information about a population's behavior (or the distribution of a behavior) to otherwise know the appropriate sample size. Slovin's formula is written as: $n = N / (1 + Ne/2)$ Where: n = the number of samples N = the total population How a sample size calculator works A calculator helps you determine the number of people you need to survey (your sample size calculation) based on the level of accuracy you want to achieve. Accuracy is determined by the following three variables: 1. Population size Population size is the total number of people in the audience you want to study. For example, if you want to use an on-page survey to study your website visitors, and you have 500,000 unique visitors per month, enter "500000" as your population size. 2. Confidence level/Confidence level determines how certain you can be of your results. The industry standard for market research is a 95% confidence level, which means that if you ran the experiment 20 times, you'd get the same results (within a certain margin of error) 19 times. 3. Margin of error/Margin of error (or confidence interval) is the amount your data would be expected to vary if you ran the survey multiple times. For example, let's say you asked your users a simple "yes or no" question, and 80% answered "yes" (the question itself doesn't matter). If you had a margin of error of 5%, with a confidence level of 95%, then running this experiment 20 times would mean that 75% - 85% would answer "yes" in approximately 19 out of 20 experiments. Lower limit: 80% - 5% = 75% Upper limit: 80% + 5% = 85% Don't know your numbers? If you don't know your numbers, you can submit the form using industry standards. These default figures appear in the calculator when you load the page (Population size: 20000, Confidence rate: 95%, Margin of error: +/-5%). Other useful resources: The beginner's guide to website feedback The ultimate guide to survey questions with 50+ examples for you to use How to analyze open-ended questions [free template] External factors that affect survey accuracy No random sampling is a perfect representation of an entire target population, but you can get close. The following factors can impact accuracy, and understanding them will help you create better surveys. Population size If your population size is small, you'll need to sample a much larger percentage of your population. As the following chart shows, once your population is large enough, boosting your sample size does little (or nothing) to increase accuracy. *Accuracy = 95% confidence rate w/5% margin of error. Non-response errors If your questions discourage certain segments from responding, you've got a built-in non-response bias. For example, if you ask clients whether they've ever downloaded movies illegally, the "yes" crowd may be less likely to respond for obvious reasons—and that skews your data. Selection errors Selection errors occur when you sample a group of people outside the demographic you want to study (e.g., you want to study all your website visitors, but you only collect feedback from your paying customers). Sampling errors Sampling errors occur when a certain demographic is overrepresented in your sample (e.g., you have a 50-50 mix of men and women, but for whatever reason, more women respond). 3 golden rules to get solid data with sample sizes 1) The bigger, your sample, the better the results (up to a point). 2) A smaller margin of error requires a larger population size. 3) A higher confidence level requires a larger sample size. 4) surveys you can use to improve your business Collecting accurate survey data can help you better understand your users and improve your products and messaging in a variety of ways. Market research Market research is any set of techniques used to better understand a company's target market. Companies use market research to adapt their products and messaging to market demand. When gathering market research data, use the calculator to achieve a large enough sample size. Customer satisfaction Customer satisfaction surveys can help identify areas for improvement. That said, the sample size isn't super important here because the scores don't matter nearly as much as the reasons behind them. Study as much feedback as possible to understand what's working and what isn't. Net Promoter Score Net Promoter Score (NPS) is a popular way to measure customer loyalty, ranging from -100 to 100 (the higher the number, the more they love you). Net Promoter, Net Promoter System, Net Promoter Score, NPS, and the NPS-related emoticons are registered trademarks of Bain & Company, Inc., Fred Reichheld, and Satmetrix Systems. InPost-purchase surveys Sending surveys to your customers after they've made a purchase, asking how you're doing and what you can improve, will give you a good sense of how to hold onto good customers and how to win new ones. Read more The best way to get good at surveys is to dive right in. Take a look at our ultimate guide to survey questions to get inspired while the knowledge is fresh! Slovin's formula is written as $n = N / (1 + Ne/2)$. In the formula, n = the number of samples needed, N = total population and e = error tolerance. Slovin's formula is used in statistical analysis as a tool to determine the sample size of a population that must be taken for a specific study. This formula is only used when the sample size is unknown; for example, since things like IQ scores tend to follow a predictable distribution pattern, it is easy to find an appropriate sample size for studying this topic. Using the formula, statisticians can come up with a reliable sample size to study a given population without having to study the entire population individually. MORE FROM REFERENCE.COM In statistics, Slovin's Formula is used to calculate the minimum sample sized needed to estimate a statistic based on an acceptable margin of error. Slovin's formula is calculated as: $n = N / (1 + Ne/2)$ where: n = sample size N = population size e = acceptable margin of error To use Slovin's formula, simply enter the population size and acceptable margin of error below and then click the "Calculate" button: Population Size (N): Acceptable Margin of Error (e): In statistics, Slovin's formula is used to calculate the minimum sample sized needed to estimate a statistic based on an acceptable margin of error. Slovin's formula is calculated as: $n = N / (1 + Ne/2)$ where: n: Sample size needed N: Population size e: Acceptable margin of error The following examples show how to use Slovin's formula in practice. Example 1: Using Slovin's Formula to Estimate Population Proportion Suppose a lawyer wants to estimate the proportion of individuals in a certain neighborhood that are in favor of a new law. Suppose he knows there are 10,000 individuals in this neighborhood and it would take far too long to survey each individual, so he would instead like to take a random sample of individuals. Assume that he would like to estimate this proportion with a margin of error of .05 or less. He can use Slovin's formula to figure out the minimum number of individuals he must include in his sample: $n = N / (1 + Ne/2) = 10,000 / (1 + 10,000(0.05)/2) = 384.615$ To be conservative, the lawyer should round up to the nearest integer and include 385 individuals in his sample. Example 2: Using Slovin's Formula to Estimate Population Mean Suppose a botanist wants to estimate the mean height of a certain species of plant in some region. Suppose she knows there are 500 of these plants in the region and it would take far too long to measure each individual plant, so she would instead like to take a random sample of plants. Assume that she would like to estimate this mean with a margin of error of .02 or less. She can use Slovin's formula to figure out the minimum number of plants she must include in her sample: $n = N / (1 + Ne/2) = 500 / (1 + 500(0.02)/2) = 416.667$ To be conservative, the botanist should round up to the nearest integer and include 417 plants in her sample. Slovin's Formula: The Relationship Between Sample Size & Margin of Error There is a simple relationship between sample size and margin of error: The lower the margin of error, the larger the sample size needed. To illustrate this, consider the example from earlier when the lawyer wanted to estimate the proportion of individuals in a neighborhood who were in favor of a new law using a margin of error of 0.05. Since the total number of individuals in the neighborhood was 10,000, he used the following formula to calculate the minimum sample size needed for his survey: $n = N / (1 + Ne/2) = 10,000 / (1 + 10,000(0.05)/2) = 384.615$ However, suppose the lawyer instead wanted a margin of error of 0.01. Here is how he would use Slovin's formula to calculate the minimum sample size for this survey: $n = N / (1 + Ne/2) = 10,000 / (1 + 10,000(0.01)/2) = 5,000$ Since the lawyer decreased his margin of error, his sample size increased. This should make sense intuitively. If you want a lower margin of error (i.e. a more accurate estimate) then you must include far more individuals in your sample. Bonus: Feel free to use this Slovin's Formula Calculator to automatically calculate a minimum sample size based on a population size and acceptable margin of error. Additional Resources The following tutorials provide additional information about sampling in statistics: An Introduction to Types of Sampling Methods Population vs. Sample: What's the Difference? The Relationship Between Sample Size and Margin of Error Slovin's formula, sometimes also spelled "Sloven's formula" (e.g., Altares et al. 2003, p. 13), is an ad hoc formula lacking mathematical rigor (Ryan 2013) that gives an estimate of the sample size needed to obtain statistically meaningful results when sampling from a population of unknown characteristics. If is the population size and is the allowed probability of an error in a small representative sample, then the number of samples needed is approximately The formula was supposedly published by Slovin in 1960 (with reference reportedly given in Guilford and Frucher 1973) and independently by Yamane (1967). It is unclear exactly how useful the formula is in practice due not only to the imprecise definition of , but also because although the size of a sample must depend on population variability in the measured property, Slovin's formula lacks a parameter representing such variability (Ryan 2013.) Sample Size Altares, P. S. et al. Elementary Statistics: A Modern Approach. Manila, Philippines: Rex Book Store, 2003. Glen, S. "Slovin's Formula: What Is It and When Do I Use It? ". J. P. and Frucher, B. Fundamental Statistics in Psychology and Education. New York: McGraw-Hill, 1973. Ryan, T. P. Ch. 2. In Sample Size Determination and Power. New York: Wiley, 2013. Yamane, T. Statistics: An Introductory Analysis, 2nd ed. New York: Harper and Row, 1967. Slovin's Formula Weisstein, Eric W. "Slovin's Formula." From MathWorld—A Wolfram Web Resource. Subject classifications When it is not possible to study an entire population (such as the population of the United States), a smaller sample is taken using a random sampling technique. Slovin's formula allows a researcher to sample the population with a desired degree of accuracy. Slovin's formula gives the researcher an idea of how large the sample size needs to be to ensure a reasonable accuracy of results. Slovin's Formula provides the sample size (n) using the known population size (N) and the acceptable error value (e). Fill the N and e values into the formula $n = N / (1 + Ne/2)$. The resulting value of n equals the sample size to be used. If a sample is taken from a population, a formula must be used to take into account confidence levels and margins of error. When taking statistical samples, sometimes a lot is known about a population, sometimes a little may be known and sometimes nothing is known at all. For example, a population may be normally distributed (e.g., for heights, weights or IQs), there may be a bimodal distribution (as often happens with class grades in mathematics classes) or there may be no information about how a population will behave (such as polling college students to get their opinions about quality of student life). Use Slovin's formula when nothing is known about the behavior of a population. Slovin's formula is written as: $n = N / (1 + Ne/2)$ where n = Number of samples, N = Total population and e = Error tolerance. To use the formula, first figure out the error of tolerance. For example, a confidence level of 95 percent (giving a margin error of 0.05) may be accurate enough, or a tighter accuracy of a 98 percent confidence level (a margin of error of 0.02) may be required. Plug the population size and required margin of error into the formula. The result equals the number of samples required to evaluate the population. For example, suppose that a group of 1,000 city government employees needs to be surveyed to find out which tools are best suited to their jobs. For this survey a margin of error of 0.05 is considered sufficiently accurate. Using Slovin's formula, the required sample survey size equals: $n = N / (1 + Ne/2) = 1000 / (1 + 1000(0.05)/2) = 286$. The survey therefore needs to include 286 employees. Slovin's formula calculates the number of samples required when the population is too large to directly sample every member. Slovin's formula works for simple random sampling. If the population to be sampled has obvious subgroups, Slovin's formula could be applied to each individual group instead of the whole group. Consider the example problem. If all 1,000 employees work in offices, the survey results would most likely reflect the needs of the entire group. If, instead, 700 of the employees work in offices while the other 300 do maintenance work, their needs will differ. In this case, a single survey might not provide the data required whereas sampling each group would provide more accurate results. Ellen, Stephanie. "Slovin's Formula Sampling Techniques." sciencing.com. . 14 December 2020. APA Ellen, Stephanie. (2020, December 14). Slovin's Formula Sampling Techniques. sciencing.com. Retrieved from Chicago Ellen, Stephanie. Slovin's Formula Sampling Techniques last modified March 24, 2022. In statistics, Slovin's formula is used to calculate the minimum sample sized needed to estimate a statistic based on an acceptable margin of error. Slovin's formula is calculated as: $n = N / (1 + Ne/2)$ where: n: Sample size needed N: Population size e: Acceptable margin of error The following examples show how to use Slovin's formula in practice. Example 1: Using Slovin's Formula to Estimate Population Proportion Suppose a lawyer wants to estimate the proportion of individuals in a certain neighborhood that are in favor of a new law. 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Since the total number of individuals in the neighborhood was 10,000, he used the following formula to calculate the minimum sample size needed for his survey: $n = N / (1 + Ne/2) = 10,000 / (1 + 10,000(0.05)/2) = 384.615$ However, suppose the lawyer instead wanted a margin of error of 0.01. Here is how he would use Slovin's formula to calculate the minimum sample size for this survey: $n = N / (1 + Ne/2) = 10,000 / (1 + 10,000(0.01)/2) = 5,000$ Since the lawyer decreased his margin of error, his sample size increased. This should make sense intuitively. If you want a lower margin of error (i.e. a more accurate estimate) then you must include far more individuals in your sample. Bonus: Feel free to use this Slovin's Formula Calculator to automatically calculate a minimum sample size based on a population size and acceptable margin of error. Additional Resources The following tutorials provide additional information about sampling in statistics: An Introduction to Types of Sampling Methods Population vs. Sample: What's the Difference? The Relationship Between Sample Size and Margin of Error Powered by @Calculator Ultra Unit Converter Use the citation below to add this to your bibliography: {{ citationMap|activeStyle| }} Find More Calculator - Slovin's formula is used to determine the appropriate sample size when conducting surveys or research with a large population. It's especially useful when you don't know the characteristics of the population. Historical Background The formula is named after statistician Tarō Yamane, though it's commonly referred to as "Slovin's formula." It allows researchers to calculate the sample size based on population size and a desired margin of error. Formula The formula is: $n = N / (1 + N \times \text{times } e^{-2})$ Where: N is the population size e is the margin of error Example Calculation If you have a population of 10,000 and want a margin of error of 5%: $n = N / (1 + Ne/2) = 10,000 / (1 + 10,000 \times 0.05^2) = 385$ Importance and Usage Scenarios Slovin's formula is widely used in educational research, surveys, and statistics, especially in scenarios where determining the ideal sample size is crucial for accurate representation of the population. Common FAQs What is the margin of error? The margin of error indicates how much the results of the sample are expected to differ from the true population values. Can this formula be used for small populations? Yes, but for very small populations, other methods or a census might be more appropriate. Why is sample size important in research? The sample size directly affects the accuracy and reliability of research findings. This calculator helps you quickly determine the sample size needed for your survey or study using Slovin's formula.