

# What is considered a good confidence interval?

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A good confidence interval is one that accurately represents the true population parameter with a high level of confidence. This means that the interval has a high probability of containing the true value and a low probability of being incorrect. Additionally, a good confidence interval should have a narrow width, meaning that it is precise and provides a smaller range of possible values for the population parameter. Overall, a good confidence interval is one that is both accurate and precise, providing a reliable estimate of the population parameter.

## **What is Considered a Good Confidence Interval?**

**A confidence interval is a range of values that is likely to contain a population with a certain level of confidence.**

**One question students often have is:**

***What is considered a good confidence interval?***

**The answer: In general, narrow confidence intervals are more desirable since this provides us with a narrow range of values that we're confident contains some population parameter.**

**For example, suppose we want to estimate the mean height of a certain species of plant and we create the following 95% confidence interval:**

**95% Confidence Interval =**

**Compare this to the following 95% confidence interval:**

**95% Confidence Interval =**

The second confidence interval is much narrower and gives us a more precise idea of what the true population mean height may be.

However, in order to obtain a narrow confidence interval we must increase our sample size which is not always practical in real-world research.

To illustrate this, consider the following example.

Example: Calculating a Confidence Interval

To calculate a confidence interval for a  $\mu$ , we can use the following formula:

$$\text{Confidence Interval} = \bar{x} \pm z^*(s/\sqrt{n})$$

where:

$\bar{x}$ : sample mean  
 $z^*$ : the chosen z-values  
 $s$ : sample standard deviation  
 $n$ : sample size

The z-value that you will use is dependent on the

**confidence level that you choose. The following table shows the z-value that corresponds to popular confidence level choices:**

<b>Confidence Level</b>	<b>z-value</b>
0.90	1.645
0.95	1.96
0.99	2.58

**For example, suppose we collect a random sample of 25 plants with the following information:**

**Sample size  $n = 25$  Sample mean height  $\bar{x} = 36.5$  inches  
Sample standard deviation  $s = 18.5$  inches**

**Here is how to find calculate the 95% confidence interval for the true population mean height:**

**95% Confidence Interval:  $36.5 \pm 1.96*(18.5/\sqrt{25}) =$**

**We interpret this interval to mean that we're 95% confident that the true population mean height for this species of plant is between 29.248 inches and 43.752 inches.**

**Now suppose instead we collect the following random sample of 100 plants with the following information:**

**Sample size  $n = 100$  Sample mean height  $\bar{x} = 36.5$  inches  
Sample standard deviation  $s = 18.5$  inches**

**Here is how to find calculate the 95% confidence interval for the true population mean height:**

**95% Confidence Interval:  $36.5 \pm 1.96*(18.5/\sqrt{100}) =$**

**We interpret this interval to mean that we're 95% confident that the true population mean height for this species of plant is between 32.874 inches and 40.126 inches.**

**Notice that by simply increasing the sample size we were able to produce a more narrow confidence interval for the population mean.**

**In a real-life situation, a researcher would prefer this second interval because it gives them a more precise idea of the range of values that could contain the true population mean.**

**However, it's often more time-consuming and resource-intensive to gather larger sample sizes, so in reality it's not always practical to do so.**

**Also keep in mind that some datasets simply have more variability in the data, which causes high values for the sample standard deviation. This naturally results in wide confidence intervals.**

**Thus, in order to create a "narrow" confidence interval the only variable that researchers can actually control is the sample size.**

### **Conclusion**

**Here's a quick summary of the main points made in this article:**

- 1. Researchers often consider a "good" confidence interval to be one that is narrow.**
- 2. By increasing the sample size used, researchers can produce narrower confidence intervals.**
- 3. What is considered a "narrow" confidence interval varies from one field to the next because some types of data naturally have higher variability than others.**

### **Related:**

## Additional Resources

**The following tutorials provide additional information about confidence intervals:**

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