

Chapter 9 – General Fact Sheet

Confidence Intervals

A confidence interval for an unknown population parameter (p or μ) consists of an interval of numbers based upon the sample statistic (\hat{p} or \bar{x}).

The level of confidence represents the expected percentage of intervals that will contain the unknown population parameter. (The unknown population parameter lies between the lower bound and upper bound of the interval.)

For example, a 95% confidence interval for a population proportion p implies that if 100 different intervals are constructed, each based on a different sample from the same population, then we expect 95 of the intervals to include the population proportion p and 5 of the intervals to not include the population proportion p .

Give It a Try

- Open StatCrunch.
- StatCrunch > Applets > Confidence Intervals > for a proportion
- Leave Proportion as 0.50 and First Level as 0.95, click Create Applet.
- The intervals that do not contain the population proportion ($p = 0.50$) are shown in red, those that do contain p are shown in green. The “proportion contained” should be close to 0.95.
- Keep clicking “Simulate 100”, and notice that the proportion contained will stay close to 0.95.

Basic Format

We take a sample, and compute the sample proportion (\hat{p}) or sample mean (\bar{x}).

That sample statistic is called a point estimate, and will be the center of the confidence interval.

From there, we compute a margin of error (E). This is based on the level of confidence and the standard deviation for that sampling distribution.

The level of confidence is related to the z -value (or t -value) that separates the middle 90/95/99% of the values from the rest.

Lower Bound

point estimate - margin of error

Upper Bound

point estimate + margin of error