**Confidence Intervals**

*Estimating the true mean in the population*

Point estimation uses the theory behind sampling distributions to make estimates about population parameters based on sample statistics – in the case of confidence intervals, estimating the population mean based on the sample mean. Confidence intervals around the mean indicate the percent likelihood, or our confidence level, that the true value of the mean lies between particular estimates or points. We use sample size, mean, standard error and Z scores as part of this process.

Confidence intervals have two parts:

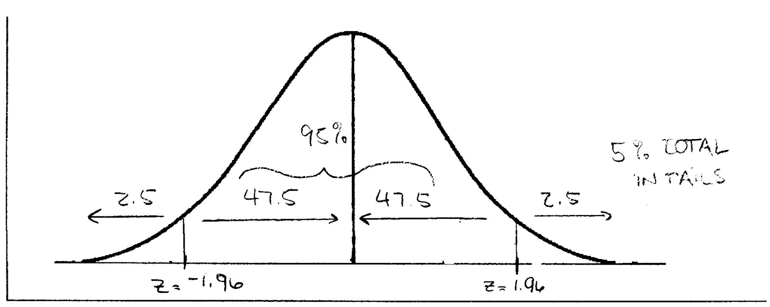
1. Confidence interval – range (upper and lower limits) within which we estimate the population mean to be
2. Confidence level - probability that the true population parameter lies within the confidence interval or our level of confidence (in percent form) that the population mean will fall in the identified range (convention is 95% or 99% probability or confidence)

<u>Confidence interval with 95% confidence level</u>

- Lower limit = sample mean – (1.96 x SE)
- Upper limit = sample mean + (1.96 x SE)

1.96 is a Z score corresponding with 47.50% area under the curve on either side of the mean. This equation is making it possible to find the raw score associated with that z score at both ends of the distribution. This allows 5% to fall, equally split, in the tails. This allows us to look at 95% of the data that is equally spread around the mean.

We can then say that we are 95% confident that the population parameter will fall between the lower and upper limit. That is, there is 95% chance that the population parameter will fall between the lower and upper limit. Here you have less confidence but a more precise range than 99%.



Confidence interval with 99% confidence level

- Lower limit = sample mean – (2.58 x SE)
- Upper limit = sample mean + (2.58 x SE)

2.58 is a Z score corresponding with 49.51% area under the curve on either side of the mean. This equation is making it possible find the raw score associated with that z score at both ends of the distribution. This allows approximately 1% to fall, equally split, in the tails. This allows us to look at 99% of the data that is equally spread around the mean.

We can then say that we are 99% confident that the population parameter will fall between the lower and upper limit. That is, there is 99% chance that the population parameter will fall between the lower and upper limit. Here you have more confidence but a less precise range than 95%.