(2)

Confidence interval

The estimated proportion plus or minus its margin of error is called a confidence interval for the true proportion. The 95% confidence for a proportion is given by:

sample proportion − margin of error ≤ true proportion ≤ sample proportion + margin of error

$$\hat{p} - z\sigma_{\hat{p}} \leq p \leq \hat{p} + z\sigma_{\hat{p}}$$

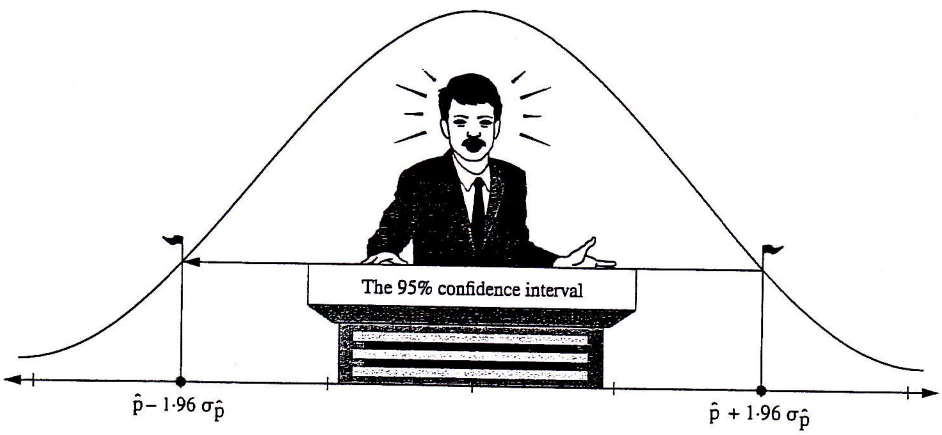
$$\hat{p} - 1{\cdot}96\sigma_{\hat{p}} \leq p \leq \hat{p} + 1{\cdot}96\sigma_{\hat{p}}$$

$$\hat{p} - 1{\cdot}96\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \leq p \leq \hat{p} + 1{\cdot}96\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

Where n is the sample size, p is the population proportion and $\hat{p}$ is the sample proportion.

We can state with 95% confidence that the true population, p, lies inside this interval. What this means is that if the same population was surveyed on numerous occasions and the confidence interval was calculated, then about 95% of these confidence intervals would contain the true proportion and about 5% of these confidence intervals would not contain the true proportion.

The end points of the 95% confidence are given by $\hat{p} \pm 1{\cdot}96\sigma_{\hat{p}}$:



It is worth noting that when p (or $\hat{p}$ instead of p if p is unknown) is close to $\frac{1}{2}$, a good approximation to the margin of error, at the 95% confidence level, is given by $E = z\sigma_p = \frac{1}{\sqrt{n}}$.