Summary

- The **STANDARD ERROR** measures the long-run average spread of the estimated values in the same hypothetical scenario.
- If the Standard Error is large, the estimator typically is far from the truth, even if its average is close to the truth
- Suppose t is an estimator then Standard Error of t equals to square root of variance of t
- The primary purpose of the standard error is to compare the precision and to estimate the sample size
- Under SRSWR variance of sample mean is given by sigma square by n.
- Under SRSWR, sample mean square is an unbiased estimator of sigma square
- The variance of population total under SRSWR is given by $N^2\sigma^2/n$
- An unbiased estimator of variance of estimated population total is given by $N^2 s^2/n$
- Under SRSWOR variance of the unbiased estimator of population mean is given by $V(\bar{y}) = (\frac{N-n}{N}) \times (\frac{S^2}{n})$
- A sample mean square s^2 is an unbiased estimator of population mean square S^2 under SRSWOR
- Under SRSWOR variance of sample proportion is given as

$$V(p) = \frac{(N-n)}{(N-1)}\frac{PQ}{n}$$

- The S.E. of sample mean

$$S.E.(\bar{y}) = \sqrt{\frac{N-n}{n} * \frac{S^2}{n}}$$

- An estimate of S.E. of sample mean

$$\hat{S.E.}(\bar{y}) = \sqrt{(\frac{N-n}{N})\frac{s^2}{n}}$$

- An estimate of S.E. of estimated population total

$$\hat{S.E.}(\hat{Y}) = \sqrt{N^2 \times \frac{(N-n)}{N} \times \frac{s^2}{n}}$$

- The S.E of the sample proportion

$$S.E.(p) = \sqrt{V(p)} = \sqrt{\frac{N-n}{N-1} * \frac{PQ}{n}}$$

- An estimate of S.E. of sample proportion

$$\hat{S.E.}(p) = \sqrt{\hat{V}(p)} = \sqrt{\frac{(N-n)pq}{N(n-1)}}$$