In case the statistic is the sample mean the expected value of any statistic and the mean of sampling distribution are equivalent:

$$\mu_{\bar{x}} = \mu$$

The standard error is also called the standard deviation of any quantity in case of the sampling distribution of the statistics. In case of the statistics as the sample mean, the standard error can be calculated by:

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$$

Where σ is the standard deviation of the population distribution of that quantity and n is the size (number of items) in the sample.

where,

σ = the standard deviation of the population distribution of that quantity, and

n = size of the sample.

A very important implication of this formula is that one must quadruple the sample size (4x) to achieve half (1/2) the measurement error. When designing statistical studies where cost is a factor, this may have a factor in understanding cost-benefit trade-offs.

If one has to achieve half (1/2) the measurement error then he/she should quadruple (i.e., (4×)) the sample size.

The other method is the sample median from the same population having a different sampling distribution.

For example,

Population	Sample Statistic	Sampling Distribution
inf inite, $X \sim N(\mu, \sigma^2)$	Sample mean, $\overline{X}$	$\overline{X} \sim N\left(\mu, \frac{\sigma^2}{n}\right)$
Finite (Size N), $X \sim N(\mu, \sigma^2)$	Sample mean, $\overline{X}$	$\overline{X} \sim N\left(\mu, \frac{N}{N}\frac{n}{1} \times \frac{\sigma^2}{n}\right)$
Infinite, $X \sim$ Binomial(p)	Sample Pr oportion, $\overline{P}$	$\tilde{P} \sim$ Binomial (p)
Infinite, $X_1 \sim N(\mu_1, \sigma_1^2), X_2 \sim N(\mu_2, \sigma_2^2)$	Sample Difference between Means, $\overline{X}_1 - \overline{X}_2$	$\overline{X}_1 \quad \overline{X}_2 \sim N\left(\mu_1 \quad \mu_2, \frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}\right)$

2.1.4.1. Properties of Sampling Distribution

1) The mean of the population and the sampling distribution's mean are equal.
2) According to the normal distribution the categorisation of the population mean in terms of standard deviation is:
   i) Approx. 68% of all sample means into 1 standard deviation,
   ii) 95% into 1.96 standard deviations, and
   iii) 99% into the 3 standard deviation.
3) The standard error of the mean is the standard deviation of the sampling distribution.