2.1.4.2. Sampling Distribution of Mean $\bar{X}$

The sampling distribution of the mean $\bar{X}$, is the probability distribution for every possible value of sample mean $\bar{X}$.

Expected Value of $\bar{X}$

Hence, any statistic's expected value and the mean of sampling distribution are same. When the statistics is the sample mean,

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

Standard Deviation of $\bar{X}$

Standard error of any quantity is the standard deviation of the sampling distribution of that statistics.

The standard error in case of the statistics as the sample mean will be,

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

where,

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

n = size of the sample.

2.1.4.3. Sampling Distribution of Sample Proportion $\bar{p}$

In many real life cases like success or failure, accept or reject, coin's head or tail, etc., there comes a situation when the whole population may be divided into two mutually exclusive categories i.e., either or situation, these situations are the practical examples of the binomial experiments.

If the sampling procedure is conducted appropriately and x elements out of n elements taken from a random sample (from the binomial population) have the specified characteristics, then the sample proportion $\bar{p}$ is assumed to be the best statistics. This sample proportion $\bar{p}$ can be used for the statistical inferences for the population proportion parameter p.

The formula for the sample proportion can be given as:

$$\bar{p} = \frac{\text{Elements of sample having chracteristic (x)}}{\text{Sample size (n)}}$$

2.1.5. Sample Size

The sample size for a research refers to the total number of elements of the population to be included in the sample for conducting the research study.

Both qualitative and quantitative points are involved in specifying the size of the sample for the research study. The accuracy of research depends on the size of the sample. It has been observed that a larger sample gives more accuracy and estimate levels. Apart from it, the availability of money, resources and efforts also specify the size of a sample.