Proportions

- So far we have used the sample proportion, $\hat{p}$, to make inferences about the population proportion $p$.
- To do this we needed the sampling distribution of $\hat{p}$.

Sampling Distribution of $\hat{p}$

- Shape: Approximately Normal if conditions are met.
- Center: The mean is $p$.
- Spread: The standard deviation is \( \sqrt{\frac{p(1-p)}{n}} \)
Categorical Variable

- When the response variable of interest is categorical, the parameter is the proportion of the population that falls in a particular category, $p$.

Quantitative Variable

- When the response variable of interest is quantitative, the parameter is the mean of the population, $\mu$.

Means

- We will use the sample, $\bar{y}$, to make inferences about the population mean, $\mu$.
- To do this we needed the sampling distribution of $\bar{y}$. 
Simulation

www.ruf.rice.edu/~lane/stat_sim/sampling_dist/index.html

Simulation

- Simple random sample of size n=5.
- Repeat many times.
- Record the sample mean, $\bar{y}$, to simulate the sampling distribution of $\bar{y}$.

Simulation

- Different samples will produce different sample means.
- There is variation in the sample means.
- Can we model this variation?
Population

- Shape: Basically normal
- Center: Mean, $\mu = 16$
- Spread: Standard Deviation, $\sigma = 5$

Sampling Distribution of $\bar{y}$

- $n = 5$
- Shape: Normal
- Center: Mean, $\mu = 16$
- Spread: Standard Deviation,

$$SD(\bar{y}) = \frac{\sigma}{\sqrt{n}} = \frac{5}{\sqrt{5}} = 2.24$$