Stat 101 – Lecture 25

Another Example

- Pew Research Center, Aug. 11-19, 2009. Asked a random sample of 2,010 adults nationwide:
- "Do you strongly favor, favor, oppose, or strongly oppose allowing gay and lesbian couples to marry legally?"

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Another Example

n=2,010 randomly selected adults views on allowing gay and lesbian couples to legally marry.

Strongly Favor/Favor	Strongly Oppose/Oppose	Unsure
39%	53%	8%

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Another Example

- 90% confidence interval for p, the population proportion who strongly oppose/oppose.
- 90% confidence ➡ $z^*=1.645$

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Another Example

$\hat{p} = 0.53 \quad SE(\hat{p}) = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = 0.0111$

90% confidence $\Rightarrow$ $z^* = 1.645$

$$0.53 - 1.645(0.0111) \text{ to } 0.53 + 1.645(0.0111)$$

$$0.53 - 0.018 \text{ to } 0.53 + 0.018$$

$$0.512 \text{ to } 0.548$$

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Another Example

- Note that according to this confidence interval, a majority of all adults (i.e. more than 50% of all adults) in the U.S. strongly oppose or oppose allowing gay and lesbian couples to marry legally.

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What Sample Size?

- Conservative Formula
  - The sample size to be 95% confident that $\hat{p}$, the sample proportion, will be within ME of the population proportion, p.

$$n = \frac{1}{ME^2}$$

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Example

- Suppose we want to be 95% confident that our sample proportion will be within 0.01 of the population proportion.

$$\boldsymbol{n = \frac{1}{ME^2} \Rightarrow n = \frac{1}{(0.01)^2} = 10{,}000}$$

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Sample Size

- More general formula for sample size.

$$n = \frac{(z^*)^2 \hat{p}(1-\hat{p})}{ME^2}$$

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Sample Size

- Gay and lesbian marriage example. ME = 0.01 with 95% confidence.

$$\boldsymbol{n = \frac{(z^*)^2 \hat{p}(1-\hat{p})}{ME^2} = \frac{(1.96)^2(0.53)(0.47)}{(0.01)^2}}$$

$$\boldsymbol{n = 9{,}570}$$

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