Calculating One-Population Proportion Confidence intervals

Sample Statistic ± Margin of Error

Sample Statistic ± (2 × Standard Error)

$\hat{p}$ Sample proportion ± (Z × Standard Error)

$$\hat{p} \pm \left(Z \times \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}\right)$$

$$0.037 \pm \left(1.645 \times \sqrt{\frac{0.037(1-0.037)}{108}}\right)$$

$0.037(1-0.037)/108 = 0.01816$

$$0.037 \pm 0.030$$

$$(0.007, 0.067)$$

0.7% 6.7%

Example: Sample of CoC Stat Students Canyon Country

total = 108

Smoke = 4 Cigarettes

$\hat{p} = \frac{x}{n} = \frac{4}{108}$

≈ 0.037

90% conf. Level

Standard Error?

0.018 (1.8%)

Margin of Error?

0.030 (3.0%)

Confidence Levels

(Degree of Confidence)

90%, 95%, 99%

95% ← most common

Def: Confidence Interval

Two numbers that we think the population parameter might be in between.

Def: Margin of Error

How far off we think a sample statistic could be from the population Parameter

Critical Value

Z-scores

90%: $z = \pm 1.645$

95%: $z = \pm 1.96$

99%: $z = \pm 2.576$

Assumptions

1. Random Sample
2. Individuals Independent
3. At least 10 Successes ✗
4. At least 10 failures