Confidence Intervals

- With statistics, can you ever be 100% confident in your results?

No

Formulas for Confidence Intervals:

$SE(\hat{p}) = \sqrt{\frac{\hat{p}\,\hat{q}}{n}}$ and z* (see chart below) and $ME = z * (SE(\hat{p}))$

$\hat{p}$ is sample proportion in favour. $\hat{q}$ is the sample proportion NOT in favour. n is your sample size

Your confidence interval is: $\hat{p} \pm ME$

range

Level of Confidence	z*
90%	1.645
95%	1.960
99.7%	2.576

Example: verify the CBC results.

$\hat{p} = 0.383$, $\hat{q} = 0.617$ $n = 3220$

$$SE(\hat{p}) = \sqrt{\frac{0.383 \times 0.617}{3220}} = 0.0085667...$$

$$ME = 1.96 \times 0.0085667 = 0.0167 \approx 1.7\%$$

CI: 36.6% to 40%

Application A newspaper stated that 70% of the population supported a particular candidate's position on health care. In a random survey of 50 people, 31 agreed with the candidate's position. Test the significance of this result with a confidence level of 90%. Should the newspaper print a correction?

$\hat{p} = \frac{31}{50} = .62$ $\hat{q} = 0.38$

$n = 50$

$$SE(\hat{p}) = \sqrt{\frac{.62 \times .38}{50}} = 0.06864$$

$$ME = 1.645 \times 0.06864 = 0.1129 \approx 11\%$$

CI: 51% to 73%

90%

Does advertising influence behaviour? Before a recent advertising campaign, a children's breakfast cereal held 8% of the market. After the campaign, 18 families out of a sample of 200 families indicated they purchased the cereal. Was the advertising campaign a success? Select a confidence level you feel is appropriate for this situation.

$\hat{p} = \frac{18}{200} = 0.09 \quad \hat{q} = 0.91$

$n = 200$

$SE(\hat{p}) = \sqrt{\frac{0.09 \times 0.91}{200}} = 0.020236\ldots$

$ME = 1.96 \times 0.020236 = 0.03966 \approx 4\%$

CI: 5% to 13%

not a success.