

required sample size for ME

- ▶ sample size vs. accuracy

backtracking to n for a given ME

given a target margin of error, confidence level, and information on the variability of the sample (or the population), we can determine the required sample size to achieve the desired margin of error.

$$ME = z^* \frac{s}{\sqrt{n}} \rightarrow n = \left(\frac{z^* s}{ME} \right)^2$$

A group of researchers want to test the possible effect of an epilepsy medication taken by pregnant mothers on the cognitive development of their children. As evidence, they want to estimate the IQ scores of three-year-old children born to mothers who were on this medication during pregnancy.

Previous studies suggest that the SD of IQ scores of three-year-old children is 18 points.

How many such children should the researchers sample in order to obtain a 90% confidence interval with a margin of error less than or equal to 4 points?

$$ME \leq 4 \text{ pts}$$

$$CL = 90\%$$

$$z^* = 1.65$$

$$\sigma = 18$$

$$4 = 1.65 \frac{18}{\sqrt{n}} \rightarrow n = \left(\frac{1.65 \times 18}{4} \right)^2 = 55.13$$

We need **at least 56** such children in the sample
obtain a maximum margin of error of 4 points.

We found that we needed at least 56 children in the sample to achieve a maximum margin of error of 4 points. How would the required sample size change if we want to further decrease the margin of error to 2 points?

$$\frac{1}{2} ME = z^* \frac{5}{\sqrt{n}} \frac{1}{2}$$

$$\frac{1}{2} ME = z^* \frac{5}{\sqrt{4n}}$$

$$4n = 56 \times 4 = 224$$