

Sampling and Error

Something to Consider: How are opinion polls used in political campaigns?

When polling organizations want to find how the public feels about an issue, they do not have the time or money to ask everyone. Instead they obtain their results by polling a small percentage of the population. To be sure the results are representative they need a random (or unbiased) sample.



Example 1: State whether each method would produce a random sample. Explain.

• Asking every tenth person coming out of a health club how many times a week they exercise to determine how often people in the city exercise.

no - people surveyed probably exercise more than average person
Surveying people going into an Italian restaurant to find out people's favorite type of food. no - many probably prefer Italian

• Surveying all students whose ID numbers end in 4 about their grades and career counseling needs. yes - ID's are usually alphabetical or random & wouldn't have anything to do with grades or career choices.

$$\text{Margin of Error: } ME = 2\sqrt{\frac{p(1-p)}{n}}$$

The larger the sample size, the more accurately it reflects the population.

Margin of sampling error (ME) gives a limit on the difference between how a sample responds and how the total population would respond.

If the percent of people in a sample responding a certain way is p and the size of the sample is n then 95% of the time, the percent of the population responding in that same way will be between $p - ME$ and $p + ME$

Example 2: In a survey of 1000 randomly selected adults, 37% answered "yes" to a particular question. What is the margin of error?

$$ME = 2 \sqrt{\frac{p(1-p)}{n}}$$

$$= 2 \sqrt{\frac{0.37(1-0.37)}{1000}}$$

$$\approx 0.030535$$

$$p = 37\% \text{ or } 0.37$$

$$n = 1000$$

margin of error is about 3%

* means there is a 95% chance people would answer yes between 34% and 40%.

Example 3: In a recent Gallup Poll, 25% of the people surveyed said they had smoked cigarettes in the past week. The margin of error was 3%.

A) What does the 3% indicate about the results?

The probability is 95% that the percent of people in the population who smoked in past week was between 22% and 28%. (25-3, 25+3)

$$ME = 2 \sqrt{\frac{p(1-p)}{n}}$$

$$0.015 = \sqrt{\frac{0.25(0.75)}{n}}$$

$$0.03 = 2 \sqrt{\frac{0.25(1-0.25)}{n}}$$

$$0.000225 = \frac{0.25(0.75)}{n}$$

$$n = \frac{0.25(0.75)}{0.000225}$$

$$n \approx 833.33$$

About 833 people were surveyed.