4. Except for relatively rare cases, the quality of the poll results depends on the sampling method and the size of the sample, but the size of the population is usually not a factor.

> **CAUTION** Never have the common misconception that poll results are unreliable if the sample size is a small percentage of the population size. The population size is usually not a factor in determining the reliability of a poll.

Determining Sample Size

If we plan to collect sample data in order to estimate some population proportion, how do we know *how many* sample units must be obtained? If we solve the formula for the margin of error E (Formula 7-1) for the sample size n, we get Formula 7-2 below. Formula 7-2 requires $\hat{p}$ as an estimate of the population proportion p, but if no such estimate is known (as is often the case), we replace $\hat{p}$ by 0.5 and replace $\hat{q}$ by 0.5, with the result given in Formula 7-3.

Finding the Sample Size Required to Estimate a Population Proportion

Objective

Determine how large the sample n should be in order to estimate the population proportion p.

Notation

p = population proportion

$\hat{p}$ = sample proportion

n = number of sample values

E = desired margin of error

$z_{\alpha/2}$ = z score separating an area of $\alpha/2$ in the right tail of the standard normal distribution

Requirements

The sample must be a simple random sample of independent sample units.

When an estimate $\hat{p}$ is known: **Formula 7-2** $n = \dfrac{[z_{\alpha/2}]^2 \hat{p}\hat{q}}{E^2}$

When no estimate $\hat{p}$ is known: **Formula 7-3** $n = \dfrac{[z_{\alpha/2}]^2 0.25}{E^2}$

> **Round-Off Rule for Determining Sample Size**
>
> If the computed sample size n is not a whole number, round the value of n up to the next *larger* whole number.

If reasonable estimates of $\hat{p}$ can be made by using previous samples, a pilot study, or someone's expert knowledge, use Formula 7-2. If nothing is known about the value of $\hat{p}$, use Formula 7-3.