

CHAPTER OVERVIEW

12: Sampling

Learning Objectives

- Distinguish between a population and a sample, and between population parameters and statistics
- Describe the concepts of sampling error and sampling distribution
- Compute the standard error of the mean
- Describe how the Central Limit Theorem determines the nature of the sampling distribution of the mean
- Compute a confidence interval for the mean based on the normal distribution, and describe its proper interpretation

One of the foundational ideas in statistics is that we can make inferences about an entire population based on a relatively small sample of individuals from that population. In this chapter we will introduce the concept of statistical sampling and discuss why it works.

Anyone living in the United States will be familiar with the concept of sampling from the political polls that have become a central part of our electoral process. In some cases, these polls can be incredibly accurate at predicting the outcomes of elections. The best known example comes from the 2008 and 2012 US Presidential elections, when the pollster Nate Silver correctly predicted electoral outcomes for 49/50 states in 2008 and for all 50 states in 2012. Silver did this by combining data from 21 different polls, which vary in the degree to which they tend to lean towards either the Republican or Democratic side. Each of these polls included data from about 1000 likely voters – meaning that Silver was able to almost perfectly predict the pattern of votes of more than 125 million voters using data from only 21,000 people, along with other knowledge (such as how those states have voted in the past).

[12.1: How Do We Sample?](#)

[12.2: Sampling Error](#)

[12.3: Standard Error of the Mean](#)

[12.4: The Central Limit Theorem](#)

[12.5: Confidence Intervals](#)

[12.6: Suggested Readings](#)

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