

Unit 5, Video 1: Sampling Error

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Often a researcher would like to know a population mean, but due to time/money or other constraints she is unable to survey the entire population to calculate the population mean.

μ

In these cases, a random sample taken from the population can be used. The sample mean can be used to estimate the population mean.

\bar{x}

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Example: The U.S. Department of Labor wishes to know the mean yearly income of full time workers in the U.S.

But they do not have time/money to survey all of the approximately 112 million full time U.S. workers. So they take a random sample of 4,000 full time U.S. workers. The sample mean is used as an estimate of the population mean.

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Sampling error: $\mu - \bar{X} = \text{sampling error}$

The sample mean (that is being used to estimate the population mean) will probably not be exactly equal to the population mean

Note: In the real world, the researcher will NOT be able to calculate the sampling error (because she does not know the population mean)

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Often a researcher would like to know a population proportion, but due to time/money or other constraints she is unable to survey the entire population to calculate the population proportion.

π

In these cases, a random sample taken from the population can be used. The sample proportion can be used to estimate the population proportion.

p

Example: The Gallup Organization wishes to know the proportion of the voting-age population in Texas who plans to vote for Rick Perry in November.

But they do not have time/money to survey all of the approximately 16 million voting age Texans. So they take a random sample of 1,000 voting age Texans. The sample proportion is used as an estimate of the population proportion.

Sampling error:

$$\pi - \rho = \text{Sampling error}$$

The sample proportion (that is being used to estimate the population proportion) will probably not be exactly equal to the population proportion

Note: In the real world, the researcher will NOT be able to calculate the sampling error (because she does not know the population proportion)

Question: If it is impossible for a researcher to calculate sample error in the real world, then how can she know if her sample estimates of the population mean or the population proportion are any good?

Answer: She will never know with 100% certainty, but statisticians can tell her the probability that her sample estimate is close to the true population mean or population proportion.

This is the topic of the next video.