

Definitions

Element: The entity on which data are collected

Population: A collection of all the elements of interest

Sample: A subset of the population

Sampled population: The population from which the sample is collected

Frame: a list of elements that the sample will be collected from

Sampling from an Infinite Population

Populations generated by an ongoing process are referred to as Infinite Populations: parts being manufactured, transactions occurring at a bank, calls at a technical help desk, customers entering a store

Each element selected must come from the population of interest, Each element is selected independently.

Sampling Distribution of

Expected value of $\bar{x}$: $E(\bar{x}) = \mu$

Standard Deviation of $\bar{x}$:

Finite Population: $\sigma_{\bar{x}} = \sqrt{N-n/(N-1)} (\sigma/\sqrt{n})$

Infinite Population: $\sigma_{\bar{x}} = \sigma/\sqrt{n}$

Z-value at the upper endpoint of interval = largest value - $\mu/\sigma_{\bar{x}}$

Area under the curve to the left of the upper endpoint = largest value - $\mu/\sigma_{\bar{x}}$ on the z table

Z-value at the lower endpoint of the interval = smallest value - $\mu/\sigma_{\bar{x}}$

Area under the curve to the left of the lower endpoint = smallest value - $\mu/\sigma_{\bar{x}}$ on the z table

Probability = area under curve to left of upper endpoint - area under curve to left of lower endpoint

When selecting a different sample number, expected value remains the same. When the sample size is increased the standard error is decreased.

Sampling from a Finite Population

Finite Populations are often defined by lists: Organization Member Roster, Credit Card Account Numbers, Inventory Product Numbers

A simple random sample of size n from a finite population of size N: a sample selected such that each possible sample of size n has the same probability of being selected

Point Estimation

Point Estimation is a form of statistical inference. We use the data from the sample to compute a value of a sample statistic that serves as an estimate of a population parameter.

$\bar{x}$ is the point estimator of the population mean

s is the point estimator of the standard deviation

$\hat{p}$ is the point estimator of the population proportion

$\bar{x} = (\sum x_i)/n$

$s = \sqrt{\sum (x_i - \bar{x})^2 / (n-1)}$

$\hat{p} = x/n$

Sampling Distribution of

Expected value of $\hat{p}$: $E(\hat{p}) = p$

Standard Deviation of $\hat{p}$:

Finite Population: $\sigma_{\hat{p}} = \sqrt{N-n/(N-1)} (\sqrt{p(1-p)/n})$

Infinite Population: $\sigma_{\hat{p}} = \sqrt{p(1-p)/n}$

Z-value at the upper endpoint of the interval = largest value - $p/\sigma_{\hat{p}}$

Area under the curve to the left of the upper endpoint equals z value of largest value - $p/\sigma_{\hat{p}}$

Z-value at the lower endpoint of the interval = smallest value - $p/\sigma_{\hat{p}}$

Area under the curve to the left of the lower endpoint = z = value of smallest value - $p/\sigma_{\hat{p}}$

Probability = area under curve to left of upper endpoint - area under curve to left of lower endpoint

