

7.1 Sampling + ~~7.2~~ + ~~7.7~~ + ~~7.3~~

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Recall that:

- An element is the entity on which data are collected.
- A population is the collection of all the elements of interest.
- A sample is a subset of the population.

* The reason we select a sample is to answer a research question about population.

* The sampld population is the population from which the sample is drawn.

* A frame is a list of the elements that the sample will be selected from.

Examples: 1 "Finite Population"

A political party in Texas wanted to estimate the proportion of registered voters in the state favoring the candidate.

A sample of 400 registered voters were selected, and 160 of the 400 voters indicated a preference for the candidate.

Hence, the estimated proportion of the population of registered voters favoring the candidate is $\frac{160}{400} = 0.40$

- Sampled Population is all registered voters in Texas.

- Frame is a list of all the registered voters.

- A sample proportion provides an estimate of population proportion, asampling error is expected.

2 "Infinite Population" or "Process"

A tire manufacture wanted to estimate the mean useful life of the new tires. The manufacture produced a sample of

120 tires for testing. The test results provided a sample mean

of 36,500 miles. Hence, the estimated mean useful life for the population of new tires is 36,500 miles.

- Sampled Population is infinite: since the sample of 120 tires was obtained from a production process at a particular point in time.

- Frame: impossible to construct.

- A sample mean provides an estimate of population mean, asampling error is expected.

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Example*: Suppose that the state wants to develop the portfolio of the company's 2500 managers in order to characterize

- * the mean annual salary and
- * the proportion of managers who completed the company's training program.

The data that contain this information for all 2500 managers is on the CD. Thus, we can compute the:

- Population mean: $\mu = \$51,800$
- Population stan. deviation: $\sigma = \$4000$
- The data shows that 1500 managers completed the training program
 \Rightarrow Thus, the proportion of the population who completed the training program is $p = \frac{1500}{2500} = 0.60$
- $\mu = \$51,800$, $\sigma = \$4000$, $p = 0.60$, ... are called parameters of the population.
- Parameters; are numerical characteristics of a population.

Now suppose that the data were not saved on CD.

How then the state can estimate the population parameters by using a sample of managers rather than all 2500 managers.

- If a sample of 30 managers (for example) will be selected, then the time and the cost of developing a profile will be less than if we consider the entire population.

- How to select the sample ?!