

Chapter 12

Sample Surveys

At the end of this chapter, you should be able to

- Identify populations, samples, parameters and statistics for a given problem.
- Take a simple random sample from a population.
- Understand and apply the principles of sampling.
- Identify the common problems in sampling and their impact on results.

Who will win the Presidential Election in November?

- Won't know until Election Night (maybe!)
- Polls try to determine the answer to this question.
- Do they talk to all voters?

Idea I: Take a Sample

- _____ (Large Who)
 - Group of people we want information from.
 - Generally, very large.
 - Impractical or prohibitively expensive to talk to everyone

Idea I: Take a Sample

- _____ (Small Who)
 - Smaller group of people from population.
 - Group we get information from.
 - Want sample to be _____

Information Gathered (The Whats)

- _____ (The Large Whos)
 - _____
- _____ (The Small Whos)
 - _____

Parameters and Statistics

Name	Statistic	Parameter
Mean		
Standard Deviation		
Proportion		
Correlation		

Idea 2: Select the Sample Randomly

- Controls for factors you know exist in data.
 - Gender
 - Race
 - Religion
 - Socio-economic status
- Controls for unknown factors.

Idea 2: Select the Sample Randomly

- Allows you to make _____.
 - The point of Statistics
- Without random selection, you cannot use your sample to make inferences about population.

Idea 3: Sample Size Matters

- How many people should you sample?
- Depends on population size, right?

Idea 3: Sample Size Matters

- Size of _____ matters.
 - Usually need a couple of hundred.
- Size of _____ doesn't.
 - Fraction of population sampled not important.

How do you sample randomly?

- Might want every population member to have equal chance of being selected.

How do you sample randomly?

- Make every combination of population members have equal chance of being selected.
- ---

 - Get a sampling frame (list of names of pop.)
 - Assign a number to each person on sampling frame.
 - Use random numbers to select sample.

Selecting a SRS

- Population = 30 firms.
- Sample = 4 firms.
 - Number the firms 01,02,...,09,10,11,12,...,30.
 - Go to random number table and write down numbers by twos.
 - Throw out 00 and 31 through 99.
 - Throw out repeats.
 - First 4 numbers are sample.

Selecting a SRS

- Random numbers
69051 64817 87174 09517 84534 06489 87201
- By twos
69 05 16 48 17 87 17 40 95 17 84 53 40 64 89 87 20
- Throw out 00 and 31 through 99
05 16 17 17 20
- Throw out repeats
05 16 17 20
- Sample = 05 16 17 20

Stratified Random Sample

- Large populations will be made up of smaller homogenous groups.
- Make sure each group included in sample.
 - Usually in proportion of population.

Stratified Random Sample

- 120 men and 80 women are in company.
- Opinions on policy of arrival of children.
- Sample 20 people (10% of population)

Cluster Sampling

- Difficult to get sampling frame for large population.

Cluster Sample

- Survey Catholic church goers in Boston.

Gallup

- Major polling organization
 - Presidential polling
 - Opinion polling
- Multi-stage sampling
 - Combination of SRS, stratified and cluster sampling.

What can go Wrong?

- Biased Samples

- - Ex. CNN Quick Poll
 - Ex. Ann Landers
- - Ex. Mall poll
 - Ex. Internet
 - Company database

What can go Wrong?

- - Need a good sampling frame.
- - People elect not to participate in survey.

What can go Wrong?

- - People will lie.
 - Illegal or unpopular behavior.
 - Leading questions from interviewer.
 - Faulty Memory.
- - Confusing wording – use of negatives.
 - Leading questions.

Inference about Population

- Biased samples tell us nothing about the population.

Inference about Population.

- Random samples have sampling variability.
- Random samples are _____
 - Outcome unknown before taking sample.
 - Long term behavior predictable.

Inference about Population

- Larger random samples give more accurate results about population.

Inference about Population

- Even random samples can produce bad results.
 - _____
 - _____
 - _____
 - _____