



MATH225

Data Collection and Experimental Design

Designing a Statistical Study

1. Identify the variable(s) of interest (the focus) and the population of the study.
2. Develop a detailed plan for collecting data. If you use a sample, make sure the sample is representative of the population.
3. Collect the data.
4. Describe the data, using descriptive statistics techniques.
5. Interpret the data and make decisions about the population using inferential statistics.
6. Identify any possible errors.

Example: A candy manufacturer is interested in the distribution of colors in each of its packages of candy sold. What should researchers do first?

- A. **Write a question about the distribution of colors in each package.**
- B. Choose a random sample of candy packages to analyze.
- C. Make some initial conclusions about the distribution of the colors.
- D. Make some initial conclusions about colors most people want.

Data Collection: Types of Studies

1. **Observational Studies**—You watch but you do not change existing conditions.

Ex: Walmart/grocery store

2. **Experiment**—a treatment is applied. Control Group: no treatment is applied...maybe a placebo is given.

Ex: Fat free doritos and regular doritos

3. **Simulation:** use of a mathematical or physical model to reproduce the conditions of a situation or process.

Ex: Dangerous/expensive like new strain of disease and you want to see how fast it spreads

4. **Survey:** investigation of one or more characteristics or a population.

Ex: Phone or paper surveys

Example: Decide which method of data collection you would use to collect data for the study.

a) **A study of the effect on the taste of popular soda with less carbonation.**

- Experiment
- Survey
- Simulation
- Observational Study

b) **A study of how fast a cloud of volcanic ash would spread over a metropolitan area.**

- Experiment
- Survey
- Simulation
- Observational Study

c) **A study of how often people wash their hands in public restrooms.**

- Experiment
- Survey
- Simulation
- Observational Study

d) **A study of the success of graduates of a large university in finding a job within one year of graduation.**

- Experiment
- Survey
- Simulation
- Observational Study