

## Lesson 2: The Statistical Process & Design of Studies

### Preparation

**Directions:** Please fill in Part I as you study the Reading Assignment. Once you finish the reading, complete the questions on Part II. You may use your notes, the key, and the help videos. Be sure to take this completed assignment to your group meeting where you can ask and help answer questions on this assignment.

### Problems

**Part I:** Use the information in the reading assignment to complete these questions.

1. State the five steps of the statistical process and provide a brief description for each step.
2. Match the following statistical terms with their appropriate definitions.  
\_\_\_\_ Simple Random Sample (SRS)  
\_\_\_\_ Stratified Sampling  
\_\_\_\_ Systematic Sampling  
\_\_\_\_ Cluster Sampling
  - a. Subjects are in groups according to similarity of some characteristics (e.g. age, income level, political party); specifically take a simple random sample from each group. (Homogeneous)
  - b. Subjects are in “some” sequential order. Randomly select one subject (to start your sampling) then ask every  $k^{th}$  subject.
  - c. Computer generated; draw from a hat, etc.
  - d. Subjects are put into groups that “hopefully” represent the population. Randomly select one or more groups and sample everybody in that group. (Heterogeneous)
3. Provide a brief description for each of the follow terms.  
Experiment -  
Observational Study -  
Treatment -  
Response Variable -  
Subjects -
4. Define the Null and Alternative Hypothesis.
5. Define the P-value.

**Part II:**

6. Determine the correct sampling method for each scenario.
  - a. A medical student researches the prevalence of aspirin usage by questioning all of the patients who enter her clinic for treatment.

- b. The Colorado Department of Health obtains an alphabetical list of 2,000,000 adult Colorado residents and constructs a pool of survey subjects by selecting every 1,000th name on the list after randomly choosing one person from the first 1,000 on the list.
  - c. In a Gallup Poll of 1,059 adults, the interview subjects were selected by using a computer to randomly generate telephone numbers that were then called.
  - d. A dietitian has partitioned people into age categories of under 18, 18-49, 50-69, and over 69. She is surveying a simple random sample of 200 members from each category.
  - e. A Johns Hopkins University researcher surveys all cardiac patients in each of 30 randomly selected hospitals.
7. The American Medical Association wanted to determine general patient satisfaction with the patient's primary care physician. Determine the type of sampling method used in the following scenarios.
- a. They take a simple random sample of doctors and then sample all of the patients that the doctor works with.
  - b. They put all of the residents' names in a computer and use a random number generator to get a sample of 100 patients.
  - c. They divide the residents up by gender and then do a simple random sample of residents within each gender.
  - d. They randomly pick key intersections in the city and then picking every fifth person that walks by after randomly picking one of the first five people to be in the sample.
8. Determine for each scenario whether it is an observational study or an experimental design. If it is an experimental design, determine the response, treatment and subjects.
- a. The Center for Disease Control obtains current flu data by randomly polling 300 men and 300 women.
  - b. You plan to conduct an experiment to test the effectiveness of Sleeppeze, a new drug that is supposed to reduce insomnia, so you randomly divide 1,000 patients into two groups, where half get Sleeppeze and the other a placebo. You record the gender of each subject. You will then observe how many hours of sleep they get in a week.
9. In September 2004, Nucryst Pharmaceuticals, Inc. announced the results of its first human trial of NPI 32101, a topical form of its skin ointment. A total of 224 patients diagnosed with skin irritations were randomly divided into three groups as part of a double-blind, placebo-controlled study to test the effectiveness of the new topical cream. The first group received a 0.5% cream, the second group received a 1% cream, and the third group received a placebo. Groups were treated twice daily for a 6-week period and the degree of skin irritation was recorded at that time.
- a. Is this a designed experiment or an observational study?
  - b. What are the subjects?
  - c. What is the response variable in the experiment?
  - d. What are the treatments?