

Stat 104 – Lecture 3

Observational Studies

- Simply observing what happens
 - A sample survey is an observational study.
 - There are other observational studies that are not surveys.

1

Tanning and Skin Cancer

- This observational study involved 1,500 people.
- Found people who had skin cancer and other people who did not have skin cancer.
- Asked all participants whether they used tanning beds.

2

Diet and Blood Pressure

- Enroll 100 individuals in the study.
- Give each a diet diary. Everything eaten each day is recorded. From the diary entries the amount of sodium in the diet is calculated.
- Measure blood pressure.

3

Stat 104 – Lecture 3

Differences

- Retrospective – look at past records and historical data.
 - Tanning and Skin Cancer
- Prospective – identify subjects and collect data as events unfold.
 - Diet and Blood Pressure

4

Experiments

- Explanatory variable – Factor.
- Response variable.
- Subjects – Participants – Experimental Units.
- Treatments.

5

Experiments

- The experimenter must actively and deliberately manipulate the factor(s) to establish the method of treatment.
- Experimental units are assigned at random to the treatments.

6

Stat 104 – Lecture 3

Controlling Cholesterol

- Does a higher dose of a new drug lower cholesterol more?
 - 30 participants.
 - Factor – drug dose.
 - Treatments: 10 mg or 20 mg.
 - 15 subjects randomly assigned to each treatment.
 - Response – change in cholesterol.

7

Experimental Principles

- Control
 - Outside variables
 - Control group
- Random assignment
- Replication
 - within an experiment.
 - repeating an entire experiment.

8

Control

- Control outside variables that may affect the response.
 - Have subjects of the same age, gender, general health, ethnic group.
 - By controlling outside variables you prevent those variables from causing variation in the response.

9

Stat 104 – Lecture 3

Control Group

- Have a group that receives 0 mg.
 - The 0 mg pill is called a placebo (no active ingredient).
 - The control group allows the experimenter to establish whether the drug is effective at all in reducing cholesterol.

10

Random Assignment

- Random assignment tends to spread the effects of uncontrolled outside variables evenly across the treatment groups.
- Random assignment reduces the chance that an uncontrolled outside variable will bias the results.

11

Replication

- Within an experiment.
 - Have several experimental units in each treatment group.
 - Able to assess the natural variation in the response for units treated the same way.

12

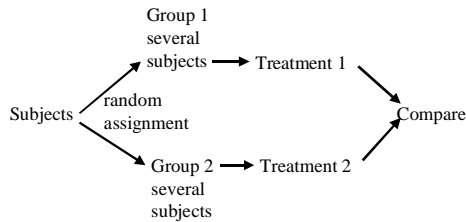
Stat 104 – Lecture 3

“Replication”

- Repeating the entire experiment.
 - This is especially important if the subjects in an experiment are not randomly selected from a population.
 - Are the results of the entire experiment repeatable?

13

Diagram



14

Multiple Factors

- Factors
 - Calculator (yes, no)
 - Formula sheet (yes, no).
- Treatments
 - calculator and formulas, calculator but no formulas, formulas but no calculator, no calculator and no formulas.

15
