STAT05

Discussion 1

LECTURE REVIEW

- Randomized Experiment
- vs.
- Observational Study

RANDOMIZATION

In a **randomized experiment** researchers apply **treatments** to experimental units (people, animals, plots of land, etc.) and then proceed to observe the effect of the treatments on the experimental units.

In an **observational study** researchers observe subjects and measure variables of interest without assigning treatments to the subjects.

RANDOMIZATION

The biggest difference between randomized experiment and observational study is **randomization**.

Randomization is an impartial chance procedure is used to assign the subjects to treatment or control group. In observational study, the researchers did not assign people to groups. They are divided by some other features: such as their habits.

EXAMPLE 1

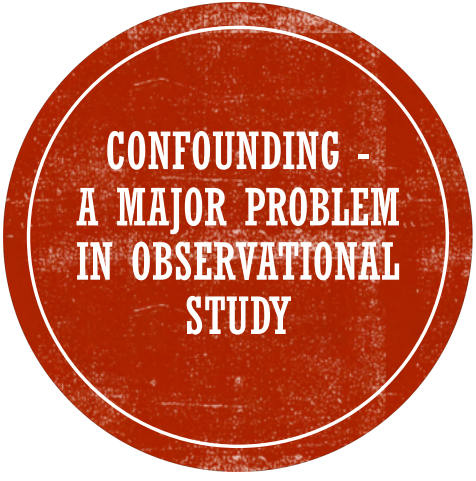
A study took random sample of adults and asked them about their bedtime habits. The data showed that people who drank a cup of tea before bedtime were more likely to go to sleep earlier than those who didn't drink tea.

Another study took a group of adults and randomly divided them into two groups. One group was told to drink tea every night for a week, while the other group was told not to drink tea that week.

DOUBLE-BLIND

- Neither the subjects nor the researchers who measure the responses should know who was in the treatment group and who was in the control group.

- Double blind experiments are usually more reliable than single-blind experiments.



A difference between the treatment group and control group-other than the treatment-which affects the response being studied.

A possible confounding factor (PCF) is a third variable, both associated with treatment variable and with outcome variable.

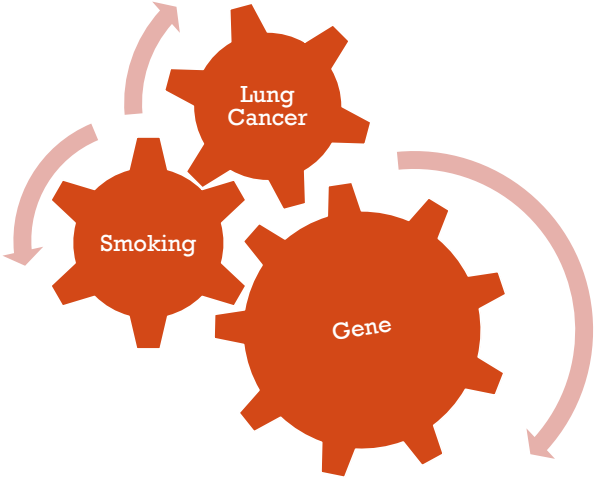
EXAMPLE 2

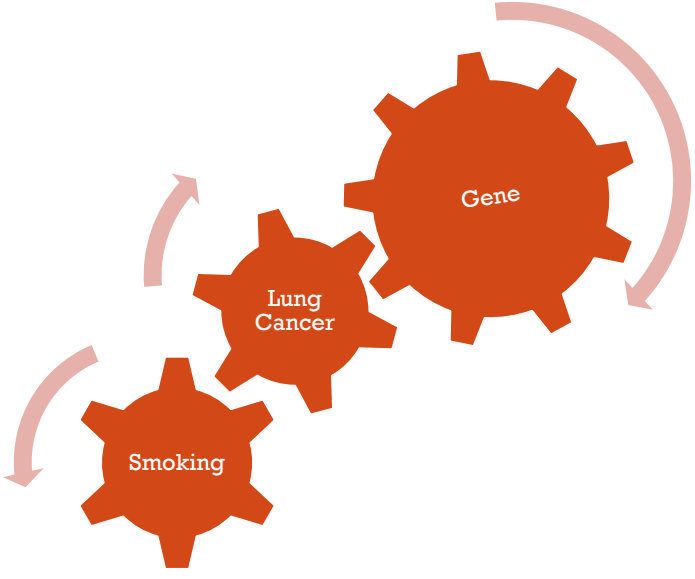
An study has found that heavy smokers get lung cancer at higher rate than light smokers.

Can researchers get the result that smoking will cause lung cancer?

What is a possible confounder in this study?

CONFOUNDER





SUMMARY

- Treatment Variable, Outcome variable
- Treatment Group, control group
- Randomized experiment vs. Observational Study
- PCF (Definition, example)

QUIZ

- 1. A study found that people who eat more than 700 grams of processed meat daily have increased risk for cancer.

- Is the comparison based on an observational study or a randomized controlled experiment? As usual, explain how you reached your conclusion.

QUIZ ANSWER

- 1. A study found that people who eat more than 700 grams of processed meat daily have increased risk for cancer.

- Solution: Observational study. There is no randomization. Randomization is the process that the researchers assign people into different group. Here the researchers do not assign people into different groups. People are divided into groups by their habits.

PREVIEW CH19

- Population
- Sample
- Sampling method

EXAMPLE

- We want to know the average age of eligible voters in the U.S. And we have got a sample of 10,000 eligible voters in the U.S.

- A. All eligible voters in the U.S.
- B. 10,000 eligible voters in the U.S.

- Population(A) Sample(B)

- How we can get these samples(10,000 eligible voters)?

SELECTION BIAS

- A systematic tendency on the part of the sampling procedure to exclude one kind of person or another from the sample
- Any examples?

- People from telephone books , club membership list, people encountered at a certain area

- When a selection is biased, will taking a larger sample help?
- This just repeats the basic mistake on a larger scale.

NON-RESPONSE BIAS

- People did not respond to your survey or poll.
- When there is a high non-response rate, look out for non-response bias.

SAMPLING METHODS

- **Simple Random Sampling**: drawing without replacement
- **Stratified Sampling**: separating the population into non-overlapping groups called layer and then obtained SRS samples from each layer
- Average age of all UCSC undergraduate students
- **Clustering Sampling**: selecting all individuals within a randomly selected collection or group of individuals.
- Spatial data
- **Systematic Sampling**: selecting every kth individual from a population (or list)
- **Convenience Sampling** : will have selection bias