Sample from a Population
→ We can answer questions about the population

Observational or Experimental study is interested in studying
a process   How does the population change or
how is it impacted by some variable.

Ex: Does smoking influence your chances of getting
lung cancer.

Treatment → This is the variable(s) that we want to know the
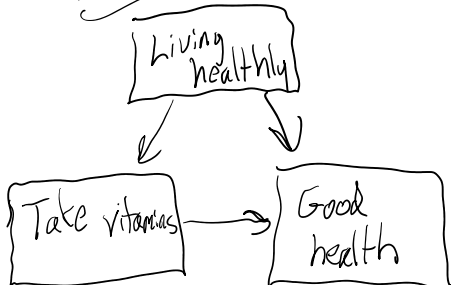impact of. (Ex: smoking, UBI, take vitamins)

Observational Study

We look for individuals representative of our population of interest
who take and don't take treatment of their own volition

(Study subjects assign themselves treatment)

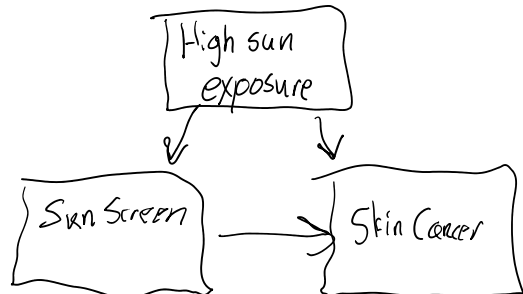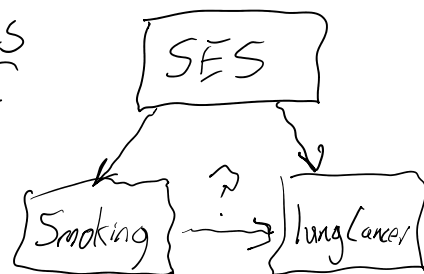Ask: Do people who smoke experience lung cancer at a higher rate.

Advantages of Obs Study   Disadvantages

→ Easy, cheap   Correlation does not
→ ethical   imply causation

Lurking Variables are related to the treatment variable and the
outcome variable

Experimental Design → Experiments assign treatment to subjects rather than letting subjects assign themselves.

→ Randomization: We want to randomize treatment
    ↳ any lurking variables
→ Control: Any variable we can influence, we can maintain consistency.

(Distinct from control group which is a group not receiving treatment)

Advantages

We more easily show causation
We can rule out (or control) impact of unrelated variables.

Disadvantages

Costly and difficult.

Ethics

Ethics

Blocking → If our subjects have key differences that might impact results of the study, we block similar individuals together and treatments and control within blocks.

Blind vs Double Blind:
   or
Masked vs Double Masked:

Either subjects or researchers (masked) or both (double masked) are unaware of treatment.

Placebo Effect: Taking a treatment of any kind can impact (typically) health or other outcomes.

Replication → A study and its results should be replicable (or repeatable)

Non-Response: When a subject or individual selected for sample does not actually participate.
Controversial questions can impact non-response (Anonymity helps reduce unwillingness to respond)

Non-Compliance: In context of an experimental design, non-compliance occurs when a subject assigned treatment doesn't follow through.