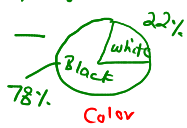


Sampling Methods

- Convenience Sampling

- Quota Sampling



Problem
Where to stop?



22% white, 78% blacks
52% men, 48% women

Ensures that sample is representative of the population.

- Random Sampling

$N = 1000$
 $n = 50$



Uniform



Selection bias



3 has double chance.

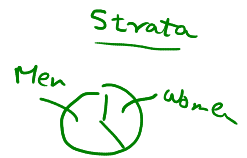
Simple Random Sampling is the best option to eliminate biases in your sample.

Can be expensive & time consuming.

- Stratified Sampling

└ Quota Sampling

└ Simple random sampling within each stratum.



② Sample
Conduct a study

Coffee — Good Health
No coffee — Less Good Health } $\Rightarrow$ Coffee causes good health.

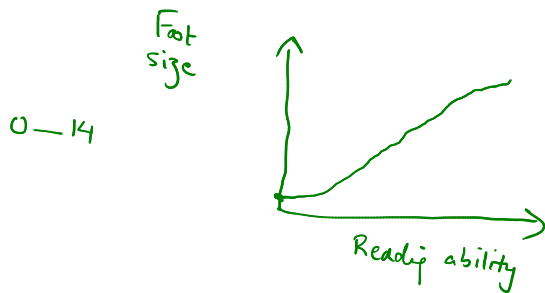
② Is smoking bad for your health?

(3) Do hospitals cause death?

Park $\downarrow$ death
 Police St. $\downarrow$
 Hotels $\downarrow$
 Hospitals $\uparrow$

$\Rightarrow$ Hospitals cause deaths.

④ Does reading increase the size of your foot?



Age

Foot size — Ready ability

Confounding factor

Correlation $\neq$ causation
(Association)

$X - Y$
Correlated

$X \Rightarrow Y$
X causes Y

$X \Leftarrow Y$
X is caused by Y

$$\begin{array}{c}
 C \\
 \swarrow \searrow \\
 X \quad Y
 \end{array}$$

 C cause both X and Y

$C_1 - C_2$
 $\Downarrow \quad \Downarrow$
 $X \quad Y$

Gene
 $\Downarrow$
 Smoky — Health

Is Homeopathic effective?
medicine

I tried, it worked.

My aunt's son, it worked.

I don't believe in it. Therefore it doesn't work.

Nazar's medicine — Cures common cold

- does not cure common cold

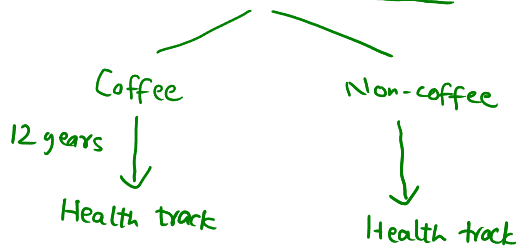
Nazar's medicine — Cure

Intl. market

Govt. policy — Oil price drop

NIH - AARP Diet & Health Study

Observational study



Coffee drinker died earlier.

Coffee is bad for health.

Coffee is assoc. with bad health.

Confounding factors?

Coffee drinkers = Smokers
= Alcohol

Non-smoking, non-drinking (alcohol) Coffee drinkers — lived longer
" " , non-coffee drinker — died early

Is COVID-19 vaccine effective?

Polio — Pakistan
— Afghanistan
— Nigeria

1954 Salk Vaccine Trials

Double-blind,

randomized,

controlled placebo

study.

- Kids (patients) did not know whether they were in treatment or control group.
- Doctors did not know which patient belonged to which group.
 - ↳ Polio is not easy to diagnose
 - ↳ Borderline case:
 - Control — polio
 - Treatment — no polio

Treatment
(vaccine)
~ 200,000

Control
(saline solution)
~ 200,000

← placebo

Sometimes the idea of getting treatment can produce good results.

"Only" difference was the vaccine

Treatment ↔ Control
Rich ↔ poor
↳ hygiene ↑ ↳ hygiene ↓