Sampling Methods and Power Analysis

Graduate Medical Education

Chelsea McQueen

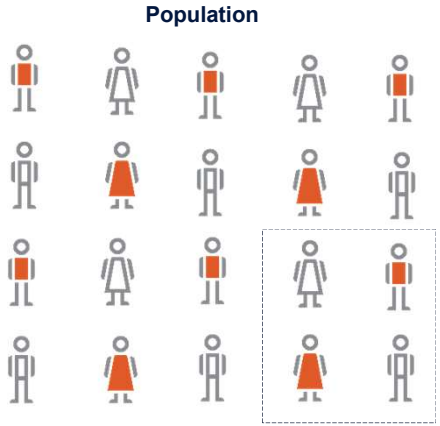
HCA Healthcare℠

Agenda

A. Non-Probability Sampling
B. Probability Sampling
C. What is Power Analysis?
D. How do you find power?
E. Minimizing Sample Size/Maximizing Power

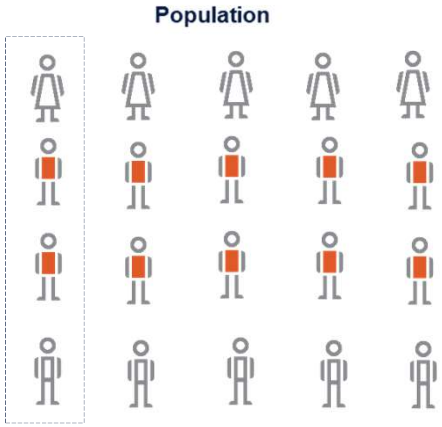
Non Probability Sampling

Convenience



Using an easily available or convenient group as a sample

Quota



Using representative data from the population to make a sample

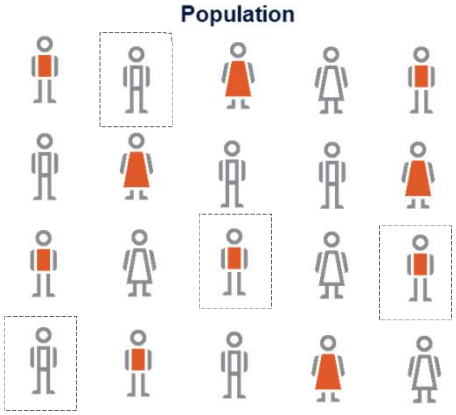
Snowball

Existing subjects provide referrals to recruit required samples; used when samples have traits that are to find.

HCA Healthcare

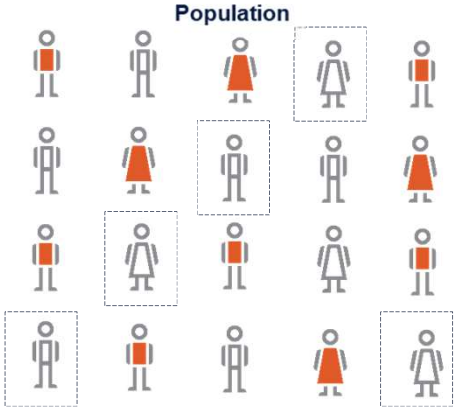
Probability Sampling

Simple Random



Samples are drawn from an exhaustive list of potential samples randomly

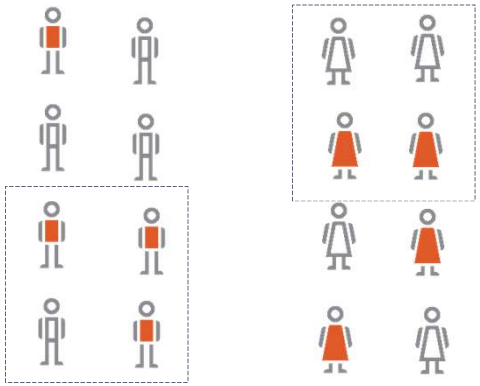
Systematic



Samples are drawn from an exhaustive list of potential samples in a systematic manner (ex. every fourth participant)

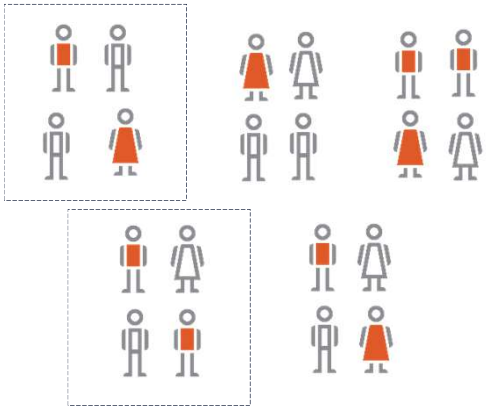
Probability Sampling

Stratified



Samples are drawn from an exhaustive list separated into strata, them randomly selected from each strata.

Cluster



Potential samples are arranged in clusters, which are selected randomly to make sample.

What is Power Analysis?

- The goal of power analysis is to provide the researcher with the number of subjects needed to that will allow for a sufficient statistical power.
- This analysis must be done very early on in the research planning process as it affects many operations and logistics of the study design and conduct.

How do you find power?

1. Establish the null and alternative hypotheses.
2. Determine an appropriate statistical test for data analysis based on the predictors and outcomes variables.
3. Estimate the effect size, which is the magnitude of association of the outcome and the predictor.
4. Determine an appropriate value of type-I error or Alpha and statistical power or 1-Beta.
5. Use the effect size or expected group difference and variability, Alpha and Beta with an appropriate sample size calculation formula

Minimizing Sample Size and Maximizing Power

- Continuous variables
- Change measurements
- More precise variables
- Uneven subject group sizes
- Subject enrichments

Knowledge Test #1:

A doctor puts patients' names in a hat and chooses without looking to get a sample of 20 patients.

What sampling method was used?

A. Stratified random sample
B. Cluster random sample
C. Simple random sample

Knowledge Test #2:

An airline company wants to survey its customers one day, so they randomly select 10 flights that day and survey every passenger on those flights.

What sampling method was used?

A. Stratified random sample

B. Cluster random sample

C. Simple random sample

Knowledge Test #3:
If the power of a research study is low, then:

A. The results of the experiment may be inconclusive.

B. Any significant findings from the research are suspicious.

C. The results are skewed.

Knowledge Test #4:
Which of the following will increase power?

A. Increasing the standard deviation

B. Increasing the sample size

C. Increasing the size of the difference between means