Calculating a Sample Size

ACFAS Research Committee

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No Disclosures

Study Population → Sample population

- Representative of larger population
- Can make inferences about a population based on sample data
- Detects probability of errors
- Limits unnecessary testing

Sample Size

Calculation method depends on the study design!

- Cross sectional study
- Case controlled study
- Cohort study
- Clinical trial

Important Concepts

- H_o- null hypothesis, treatment has no effect.
- H_a- test hypothesis, treatment has some effect

- Null hypothesis is either True **OR** False.

- Type I error- when reject H_o when the null hypothesis is actually **True**
- Type II error- when fail to reject H_o BUT H_o is **False**.

Type I Error

Reject H_o when the null hypothesis is actually true

- You are finding an association when there is NOT an association
- Probability of Type I error occuring is called the significance level (alpha)
- Typically we use 5% or 0.05
- $P<0.05$

Type II Error

Fail to reject H_o when the null hypothesis is false

- You fail to find an association when there is an association
- Probability of Type II error occuring is called beta (β)

- Power (1-β) – probability of finding an association (rejecting the null hypothesis) when an association exists
- Typically 80% or higher

Sample Size and Power

If we **increase sample size**

- Decrease probability of making Type I error (inversely proportional)
- Decrease probability of making Type 2 error and increased the power of a test (directly proportional)

Effect Size

- Effect size is the magnitude of the difference between the two groups being compared
- In fixed sample sizes, the p value decreases as the effect size increases
- The smaller the effect size that is clinically important, the more subjects you need to establish significance

Common values

- Alpha (α)= 0.05
- Power = (1-β)= 0.80
- Margin of error (confidence interval)= +/-5%
- Confidence level of 95% → z-value of 1.96

Calculate the Sample Size

$$n = \frac{z^2 \sigma^2}{E^2}$$

n= minimum sample size

z= value of standard normal distribution (from distribution table based on confidence interval)

σ = expected or probability of previous similar studies

E= max allowable deviation or margin of error

Thank You

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