임상연구 설계와 분석을 위한 통계 방법

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Chapter I: Overview of Statistics

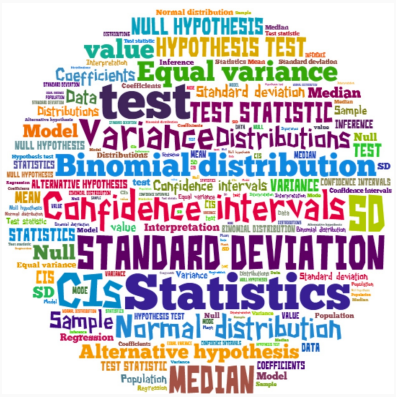
Most researchers or people think

Statistics makes us insane...

However

Statistics sometimes gives us very useful information from data!!

So then, what is statistics??



† Each wordcloud was cited from Trident University International and Augusta University, respectively.

The most important things in statistics

1. Data (sample)
   - Investigation, experiment, and survey
   - Gathering numbers (for quantitative analysis)
2. Description or Summarization
   - Table, chart, and so on
   - Based on summarized statistics (e.g. mean, standard deviation, median, . . .)
3. Inference
   - Numerous statistical tests and models based on probability theory
   - e.g. two-sample t-test, ANOVA, ANCOVA, regression, and so on

Why should we collect data (sample)?

Measure everything in everywhere

- Advantages
  - You will get exactly correct answer
  - No need to meet an awkward statistician
- Disadvantages
  - Typing “SHOW ME THE MONEY” may help your budget
  - Time is TOO SHORT TO COLLECT everything

Inferential approach

- If we have a proper sample that represents the whole population, you can get NEARLY the correct anwer

Type of variables

1. 명목척도(norminal): 성별, 혈액형, 지역, 인종

Type of Studies

Research or trial?

Research

자료의 수집과 분석 목적이 학술적 목적에 국한된 모든 종류의 연구 및 실험

Trial

자료의 수집과 분석 목적이 이윤추구 또는 허가에 목적이 있는 임상시험

Observational Study

Cross-sectional study (단면적 관찰연구)

1. prevalence study
2. Diagostic test
3. Ecological study
4. Validity, Reliability, and agreement study

Longitudinal study (종단적 관찰연구)

1. Prospective study
2. Retrospective study

Experimental Study

Randomized controlled trial

Pilot study

Exploratory study

Confirmative study

Type of outcome variables

Primary outcomes

Secondary outcomes

Surrogate variables

Global assessment variable

Sample size calculation

Two approaches

1. Based on the marginal error rate → population based observational study
2. Based on the effectiveness between concerning groups → experimental study

Both approaches are based on previous studies

Is your study entirely new?

Observational study

Observational study: prevalence study

Observational study: prevalence study

Parallel design

2×2 cross-over design

Factorial design

Multiple comparison

What makes data significant?

1. Data themselves contain unexpected errors
2. Bias
3. Just conincidence
4. Our hypothesis is working

Torturing data

Statistical Analysis

Overview

Independent two sample t-test

1. Too easy, but very useful methodology for the comparison of sample means between two groups

Analysis of Variance (ANOVA)

Analysis of Covariance (ANCOVA)

Simple or multiple regression

Repeated Measures ANOVA

Linear mixed effects model

Reliability analysis

Cohen's κ

Cronbach's α

Intra Class Correlation (ICC)