Stats Guide

Basics

Independent variable = variable manipulated by an experimenter (input)

Dependent variable = event expected to change when independent variable manipulated (output)

* Test statistic
* Population vs. sample
  + Adsf
* Variable types
  + Categorical
  + Continuous
* Normal distribution
* Z-score
* Binomial distribution
* Proportion and ratio

Lecture Outline:

* Part 1

1. Intro
2. Distributions
3. T-Test
4. ANOVA
5. Correlation and Linear Regression

* Part 2

1. Epidemiology
2. Case Control
3. Liturature Review – incidence (In) and prevalence (Pe), OR
4. Screening and Diagnostic tests – Se, Sp, PPV, NPV
5. RTC and Chi-square test
6. Meta-analysis
7. Non-parametric Tests -

Measures of Disease Occurrence:

* Prevalence (Pe)
* Incidence (In)
* Attack Rate
* Case Fatality
* Survival Rate

Compare occurrence of disease in two groups/populations:

* Risk ratio – leads to incidence measure
* Rate ratio

Case control Studies (#8)

* Epidemiological study types (increasing evidence)
  + Clinical case series
  + Cross-sectional study – determine prevalence
  + Case control study
  + Cohort study – determine incidence
  + Randomized clinical trial (RTC)
* Controls – should be from same source population (similar opportunity for exposure to risk factors)
  + Matching controls
    - Pair matching
    - Frequency matching
* Observational studies:
  + Cross-sectional(prevalence survey) – simple survey, estimate disease prevalence (Pe ratio), less power to determine causality

- Snapshot at point in time to describe the occurrence of disease or risk factors of specified population

- prevalence proportion = measure of dsease occurance

* + Case control – select based on disease cases (disease and not-diseased)
    - Objective = find difference in exposure between the cases and controls
  + Cohort study – select based on exposure (exposed and unexposed), id those that develop disease, get incidence
    - Perspective
    - Retrospective

Types of Epidemiological Studies (#8)

* Clinical case series
  + Definition
* Cross-sectional study

Definition

Definition

Types of Epidemiological Studies

o Clinical case series

􏰊Definition:  
o Cross-sectional study

􏰊Definition:

􏰊Measure of association: o Case-control study

􏰊Strategy:  
􏰊Suitable for what kinds of diseases? 􏰊How do we find cases and controls? 􏰊Measure of association:  
􏰊Advantages:  
􏰊Disadvantages:

o Cohort study  
􏰊Participants are selected based on what? 􏰊Measure of Association:  
􏰊Advantages:  
􏰊Disadvantages:

o Randomized controlled trial  
􏰊Definition of clinical trial: 􏰊Intention to treat rule:  
􏰊Randomization:

Definition:  
Masking/Blinding:

* Sample Size: pros/cons of large/small sample size:
* What is gained by randomizing?

􏰊Advantages:  
􏰊Disadvantages:

Measures of Disease Occurrence and Risk (#8)

* Incidence
  + **Risk ratio** = Cumulative incidence: probability of disease (0-1), measure of risk of disease
    - Denominator = persons free of disease at start of obsv.
  + **Rate ratio** = Incidence Rate (incidence density): rate at which new cases develop in pop. At risk during period of obsv.
    - We’re interested in how fast a condition develops in a population
    - IR = new cases per persone-time at risk
    - IR = (new cases occurring during period of obsv.)/(person-time at risk during obsv)
    - Denominator = sum of amount of time each person is actually fee of disase during period of obsv.
    - Not a proportion b/c the denominator is NOT fixed
* Prevalence
  + Pe = (all cases in population)/(all persons in population of interest)
  + Pe = incidence x duration (approximately)
  + Proportion: number of persons with disease as a proportion of the total population (weather or not they are pre-existing cases of the disease)
  + Point prevalence – proportion of population having disease at point in time
  + Period prevalence – proportion of population having disease during period of time
  + Depends on how many people who were already diagnosed still have the condition at time prevalence is measured
  + Static measure of amount of disease in population at a point/period in time
  + Affecting factors:
    - Incidence of disease (new cases)
    - Duration of disease (cases surviving from past)
  + Prevalence can increase if:
    - the incidence of disease is unchanged but cases survive for longer time b/c of better treatment
    - incidence increases while survival remains constant
  + Pe can remain same if incidence increases and survival decreases proportionately

Statistical tests template

* Purpose:
* Assumptions:
* Hypothesis:
  + HO:
  + HA:

T-Test

* Purpose:
* Types: paired, two-sample
* Assumptions:
  + Normal distribution
  + Individual observations (not dependent on one another)
  + Equal variance
* Hypothesis:
  + HO:
  + HA:

ANOVA

* Purpose:
* Independent variable = categorical
* Dependent variable: continuous
* Assumptions:
  + Normal distribution of dependent variable
  + Independent observations
  + Homogeneity of variance across groups
* Hypothesis:
  + HO: all means are equal
  + HA: at least on of the means are different