Personal notes - epidemiology

Florencia D'Andrea

2024-04-14

Table of contents

Welcome

1 Intro

1.1 Longitudinal studies

> Longitudinal studies are defined as studies in which the outcome variable is repeateadly measured; i.e. the outcome variable is measured in the same subject on several occasions.

Extracted from Twisk (2013)

Characteristics: * observations of one subject over time are not independent of each other * statistics should consider that repeated observations of each subject are correlated * this studies bring the illusion than are solving causality but only we can try temporality

Table 1.1: Statistical notation

number of subjects	i = 1 to N
number of covariates	j = 1 to J
number of times a particular subject is measured	t = 1 to T
outcome variable	Y
covariates	X

1.2 Cohort studies

1.2.1 Observational cohort studies

can be divided into: * **prospective** * The only one that can be characterized as longitudinal. * Analyze the longitudinal development of a certain characteristic over time (growth or deterioration). * **tracking**: "stability" of a certain characteristic over time

- **retrospective**
- **cross-sectional**

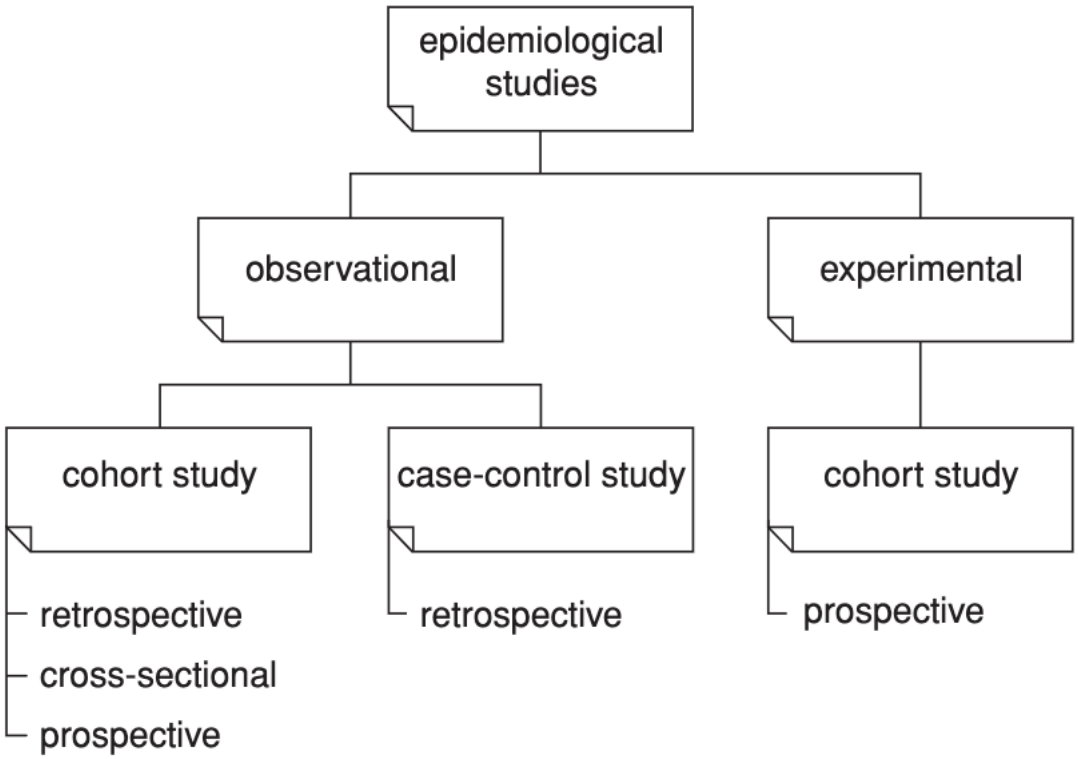

Figure 1.1: Image extracted from Twisk (2013)

1.2.2 Experimental cohort studies (clinical trials)

- are prospective (ie longitudinal).
- The outcome variable Y is measured at least twice (the classical "pre-test," "post-test" design).

stringhini, 2018

Premature mortality reduction from chronic diseases

Biological Risk factors - high blood pressure - obesity - tobacco use - excess salt intake - diabetes - insufficient physical activity - alcohol consumption

Socioeconomic status - occupational group - educational attainment - level of income and wealth - place of residence

1.3 General Additive Mixed Model (GAMM)

semi-parametric model

Let's start with an equation for a Gaussian linear model:

y= 0+x1 1+ , N(0, 2)

What changes in a GAM is the presence of a smoothing term:

y= 0+f(x1)+ , N(0, 2)

This term could be many things.

1.3.1 Walking speed and age

Fixed Effects Predictors - age - height

Random Effect - study at the intercept and age slope

1.3.2 Number of years of functioning lost (primary outcome)

It is based on the predictions of the previous model

Fixed Effects - age - age2 - height - year of birth - distances walked - risk factor under study (minimally adjusted model) - all risk factors (mutually adjusted models)

CI - Model based parametric 5000 bootstrap samples

1.3.3 Years of life lost (secundary outcome)

Difference between the areas of the survival curves. Survival curves Kaplan-Meier adjusted curves, conditional on survival to age 60 years. They run a shared frality Cox model with age as time scale, stratified by the levels of the given risk factor and a year of birth as covariate (for minimally adjusted models) or year of birth and the remaining risk factors as covariates (mutually adjusted models)

schrempft 2022

1.4 Pace of aging

similar to Dunedin Study investigators

1 - Biomarkers were standarized for healthy men and women. Z-scores were reversed for HDL and creatinine clearence.

2 - Mixed-effects models with a random interecept and a random linear slope, were used to calculate participants' personal slopes (change in biomarkers per year) Each year included time, age a t baseline center in the samples mean, and a interaction term between the time and age at the baseline. For biomarkers that show a non linear trajectory, an additionally

3 - The individual slopes for each biomarker (annual change in biomarker Z-score) wee aggregated to create a total Pace of Aging score.

Covariates: - Alcohol $>$ 14 units - hipertensive or diabetic medication - pysical inactivity - smoking status

carmeli, 2019

1.5 Terms

Table 1.2: Terms used in this analysis

Term	Definition
`non-communicable diseases/risk factors`	12
`spline`	
`cross-sectional study`	
`longitudinal study`	

2 References

3 Summary

In summary, this book has no content whatsoever.

```
1 + 1
```

```
[1] 2
```

References

Twisk, Jos W. R. 2013. *Applied Longitudinal Data Analysis for Epidemiology: A Practical Guide*. 2nd ed. Cambridge University Press.