Untitled

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Contents

- Binary outcomes and proportions
- Comparative parameters of risks and their estimation
- Binomial regression models and comparative parameters
- Adjustment for confounding and evaluation of modification by binomial regression

Main R functions covered:

- `twoby2()` (Epi package)
- `glm()`
- `ci.lin()` (Epi package)

Outcomes in epidemiologic research

Epidemiologic studies address the occurrence of diseases and other health related phenomena:

- (a) cross-sectional: **prevalence** of diseases,
- (b) longitudinal: disease **incidence**, and mortality

Often we want to compare the prevalence or incidence of disease between two groups defined by a binary *risk factor* X

- $X = 1$: `exposed` $X = 0$: `unexposed`

Types of outcome variables

- *Binary* (0/1) variables at individual level
  - disease *status* at a *time point*
  - *change* of status, *event* or *transition* ({*e.g.*} *from healthy to diseased)*
- *Proportions* at group level
  - prevalence
  - incidence proportion or cumulative incidence,
- *Rates* of events
  - incidence or mortality rate (per 1000 y)
  - car accidents (per million km)
- *Time* to event
  - survival time (often censored)

Incidence and prevalence proportions}

- **Incidence proportion** (R) of a binary (0/1) outcome (disease, death etc.) over a fixed risk period is defined

$$R = \frac{D}{N} = \frac{\text{number of new cases during period}}{\text{size of population-at-risk at start}}$$

Also called {**cumulative incidence**} **(or even "risk").\ NB.**

This formula requires complete follow-up, i.e. no *{censorings}, and absence of {competing risks}.*

- ***Prevalence (proportion)*** *P of disease at time point t*

$$P = \frac{\textit{no. of existing cases at } t}{\textit{total population size at } t}.$$

Two-group comparison

- Binary risk factor X: exposed vs. unexposed.
- Summarizy results from cohort study with fixed risk period and no losses:

Exposure	Cases	Non-cases	Group size
yes	D_1	C_1	N_1
no	D_0	C_0	N_0
total	D_+	C_+	N_+

- Incidence proportions in the two exposure groups

$$R_1 = \frac{D_1}{N_1}, \qquad R_0 = \frac{D_0}{N_0}.$$

- These are crude *estimates* of the true *risks* π_1, and π_0 of outcome in the two exposure categories.