Extensions to linear and logistic regressions

Morten Frydenberg ©
Institut for Biostatistik

Conditional logistic regression

- **When?**
- **What?**
- **How?**

Other methods for analyzing binary data

Models for **relative risks**
Models for **risk differences**

Clustered data / data with **several random components**

Continuous outcome
Dichotomous outcome

Clustered binary data with **one random components**

Nonlinear regression models

Conditional logistic regression
When

Used in two situations:

1. **Matched** studies (binary response).
2. **Unmatched** studies with a **confounder** with **many distinct values.**

In **1.** the models correspond to **the way data was collected**.

In **2.** the method adjust for a '**mathematical' flaw** in the unconditional method.

An example of situation **2.** the confounder is "*kommune*" having 275 distinct values.

Conditional logistic regression
What

The logistic regression model (outcome disease yes/no):

$$\ln(odds) = \alpha + \sum_{i=1}^{k}(\beta_i \cdot x_i)$$

ln(odds) in reference ln(odds ratios)

Suppose the model above hold in each strata:

$$\ln(odds) = \alpha_s + \sum_{i=1}^{k}(\beta_i \cdot x_i)$$

ln(odds) in reference **different in each strata**
ln(odds ratios) **the same in each strata**

Conditional logistic regression
What

$$\ln(odds) = \alpha_s + \sum_{i=1}^{k}(\beta_i \cdot x_i)$$

ln(odds) different in each strata

We are not interested in these !

In a **matched** study these are 'controlled'.

In a **conditional** logistic regression one '**condition on the odds in each strata**' , i.e. these case/control ratio.

In the conditional model the α's **disappear** !

The β's , the log OR's, are still in and **can be estimated.**