Study Design and Confounder Control in Observational Studies: Two Cases

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Outline

- The DVD/CD as a teaching aid.
- Study 1: Cohort Data (Long term effects of circumcision)
- DVD clip shown (Data available)
- Discussion: observational data v's randomised controlled trials
- Study 2: Cross sectional survey (Iron levels in New Zealand children)
- DVD clip shown (Data available)
- Confounder control by multiple linear regression
- Future work

DVD/CD as Teaching Aid

Nine studies but only two discussed

The studies

1. motivate statistics learning
2. provide project work

They have been used in

1. high schools (17/18 year olds)
2. biostatistics classes
3. regression/modelling classes
4. multivariate statistics classes

Cohort data: long term effects of circumcision on sexually transmitted diseases

Based on a birth cohort of 1037 children born 1972/73 when age 26.

Outcome measure: herpes present (Yes/No)

Predictors: Circumcised by age 3 (Yes/No)

Number of sexual partners (<10, ≥10) (the confounder)

Socioeconomic status

Education level

The first DVD clip now shown:

www.maths.otago.ac.nz/~jharraway/
Presentation 1.avi

Confounder control achieved by

1. stratification (elementary with crosstabs)
2. multiple logistic models (more advanced)

Discussion

- Crude results show circumcision protective
- But not after adjusting for number of sexual partners.
- Ethical issue of data access (simulation)
- Second large cohort study shows opposite results; conflict still to be resolved.
- Two randomized controlled trials in Uganda and Kenya (Lancet 2007) show circumcised men are 51% to 60% less likely to contract HIV than their uncircumcised counterparts.
- This case study therefore illustrates differences between observational data and randomised controlled trials.

Cross sectional survey: iron levels in New Zealand children

Based on 323 participating families randomly identified in three New Zealand cities. (This is a serious problem in New Zealand).

Study again observational

Outcome measure: log (serum ferritin level)

Predictors:

Age
Sex
Prematurity
log(diet iron level)
Infection (present/absent)
(the confounder)

The second DVD clip now shown

www.maths.otago.ac.nz/~jharraway/Presentation2.avi

Confounder control achieved by

1. omitting cases
2. multiple linear regression models (more advanced)

Future work

- A second DVD/CD is being developed.
- The DVD clips are based on current research and data are available

Examples include

- The profile of women who consume alcohol during pregnancy (logistic models – to be published)
- Alcohol and tobacco consumption among 6-24 month post-partum New Zealand women.
- Differences between Hectors and Maui dolphins (Principal Components)

My overall impression is that students enjoy and are highly motivated by these examples.

Table 6 Factors associated with presence of herpes (1 = present, 0 = absent)

Factor	Parameter	Odds Ratio (95% CI)
Circumcision (Ref: not circumcised)	-0.072	0.93(0.64, 1.36)
Sexual partners (Ref: 10 or more)	-0.992	0.37(0.26, 0.54)
Socioeconomic (Ref: High)		
Medium	-0.103	0.90(0.58, 1.42)
Low	-0.225	0.80(0.49, 1.31)
Education (Ref: High School only)		
Postsecondary	0.113	0.89(0.61, 1.30)
University	0.270	0.76(0.47, 1.25)
Constant	1.786	

Table 8 Factors associated with iron levels in children (Response: log serum ferritin level)

Factor	Parameter	Standard error	t	p-value
Log(diet iron level)	0.148	0.068	2.186	0.030
Age	-0.030	0.008	-4.032	<0.001
Sex: (Ref male)	0.156	0.080	1.941	0.053
Premature: (Ref normal)	-0.206	0.113	-1.830	0.068
Infection (Ref: CRP $\Leftarrow$ 10mg/L)	0.794	0.165	4.800	< 0.001
Constant	3.104			