Study Design and Confounder Control in Observational Studies: Two Cases

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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


**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 Hector’s 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)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Parameter</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circumcision (Ref: not circumcised)</td>
<td>-0.072</td>
<td>0.93(0.64, 1.36)</td>
</tr>
<tr>
<td>Sexual partners (Ref: 10 or more)</td>
<td>-0.992</td>
<td>0.37(0.26, 0.54)</td>
</tr>
<tr>
<td>Socioeconomic (Ref: High)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>-0.103</td>
<td>0.90(0.58, 1.42)</td>
</tr>
<tr>
<td>Low</td>
<td>-0.225</td>
<td>0.80(0.49, 1.31)</td>
</tr>
<tr>
<td>Education (Ref: High School only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postsecondary</td>
<td>0.113</td>
<td>0.89(0.61, 1.30)</td>
</tr>
<tr>
<td>University</td>
<td>0.270</td>
<td>0.76(0.47, 1.25)</td>
</tr>
<tr>
<td>Constant</td>
<td>1.786</td>
<td></td>
</tr>
<tr>
<td>Factor</td>
<td>Parameter</td>
<td>Standard error</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------</td>
<td>----------------</td>
</tr>
<tr>
<td>Log(diet iron level)</td>
<td>0.148</td>
<td>0.068</td>
</tr>
<tr>
<td>Age</td>
<td>-0.030</td>
<td>0.008</td>
</tr>
<tr>
<td>Sex: (Ref male)</td>
<td>0.156</td>
<td>0.080</td>
</tr>
<tr>
<td>Premature: (Ref normal)</td>
<td>-0.206</td>
<td>0.113</td>
</tr>
<tr>
<td>Infection (Ref: CRP &lt;= 10mg/L)</td>
<td>0.794</td>
<td>0.165</td>
</tr>
<tr>
<td>Constant</td>
<td>3.104</td>
<td></td>
</tr>
</tbody>
</table>