

## Homework 3

Due on or before Wednesday's lecture, March 3 to a TF.

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1. Consider the following 'boilerplate':

$X$  is a \_\_\_\_\_ condition for  $Y$ .

For the following statements, for each  $X$  and  $Y$  and 'fill in the blank' with 'necessary', 'sufficient', 'necessary and sufficient' as appropriate. If all options are wrong, write 'none apply'.

- (a)  $X$ =Being a human;  $Y$ =having two legs.
  - (b)  $X$ =Meeting White House resident Barack Obama;  $Y$ =Meeting the current President of the United States.
  - (c)  $X$ =Being male;  $Y$ =Being a father.
  - (d)  $X$ =Being 35 years old;  $Y$ =Serving as President of the United States
  - (e)  $X$ =Being a father;  $Y$ =Being male.
  - (f)  $X$ =A number being the square root of 16;  $Y$ =a number being 4.
  - (g)  $X$ =Meeting Michelle Obama;  $Y$ =Meeting a current resident of the White House.
  - (h)  $X$ =a number being 4;  $Y$ =A number being the square root of 16.
  - (i)  $X$ =having two legs;  $Y$ =Being a human.
2. Read the attached news article from the BBC (*Circumcision 'reduces HIV risk'*) and answer the questions that follow.

- (a) In experimental terms, what is the outcome ( $Y$ ) of interest?
- (b) What was the pre-measurement and when was it performed?
- (c) What was the planned post-measurement and when was it to be performed?
- (d) In experimental terms, what is the treatment ( $X$ ) of interest?
- (e) What is proposed causal mechanism for the link the researchers found?
- (f) Why did the researchers not simply perform an observational study? That is, why not simply compare the outcome rate between men who were *already* treated and untreated before the study began?
- (g) Was the treatment assigned randomly? How does this affect our inferences from the experiment?

- (h) It is difficult to ensure such experiments are ‘double-blind’. Aside from any selection or ethnical issues, why is this?
- (i) What was the outcome for the treated group?
- (j) What was the outcome for the control group?
- (k) The experiment ran into an ethical concern and was therefore stopped. Briefly explain that concern and how it relates to the Tuskegee syphilis experiment.

Relative to the location of the experiment, in Western Europe, this treatment is very rare (neonatal rate is 0-5%), yet the outcome rate is also much lower. In the US, this treatment is much more common (neonatal rate is 60%-70%), yet the outcome rate is on a par with Europe.

- (l) How does this fact affect our judgement of the internal validity of the experiment?
- (m) The Centers for Disease Control (CDC) is contemplating mandating the treatment for all male babies born in the US. What type of validity (internal or external) should have most bearing on their decision? Should we expect a causal effect of the same magnitude when the treatment is applied in the US? Briefly explain with reference to the current observable outcome rates from the US and Europe.

3. For the following relationships, the conclusion is possibly spurious. For each relationship (i) identify a plausible ‘lurker’  $Z$  and (ii) very briefly describe how it affects the relationship in question.

- (a) The average number of years of post-high school education ( $X$ ) and the number of non-English speakers ( $Y$ ) are highly correlated for US counties.

To increase English-language ability we should decrease the number of people going to college.

- (b) In California, people with medicare insurance ( $X$ ) were much more likely to vote in favor of Proposition 8 ( $Y$ )—an attempt to ban gay marriage—than those without.

Thus we conclude that receiving medical coverage reduces sympathy for gay civil rights.

- (c) Nurses ( $X$ ) as a group are much longer lived ( $Y$ ) than hospital janitors as a group.

This suggests janitors have much more dangerous, death-risking jobs than nurses.

4. On the BBC show ‘Kitchen Nightmares’, super-chef Gordon Ramsay visits a failing restaurant for a week and attempts to revive its business. Around half of those he helps end up closing anyway. Does this suggest that Ramsay makes no difference to the plight of the restaurants? In your answer, be sure to mention the relevant ‘counterfactual’ and ‘control’ group.

5. Using SPSS with the NES data set, consider the ‘Attendance at religious services’ [attend] variable.
  - (a) Give a frequency table for this variable.
  - (b) Using the table, report the median for this variable.
  - (c) Using the table, report the modal response for this variable.
  
6. Using SPSS with the NES data set, consider the ‘Feeling Thermometer: Hillary Clinton’ [hillary\_therm] variable. This measures how ‘warmly’ respondents feel about Hillary Clinton on a one to 100 scale (where 100 is most warm, 0 is least warm). For the purposes of this question, assume it is continuous in nature.
  - (a) Report a table with the mean, median and mode for the variable.
  - (b) Report a histogram with five intervals for this variable.

## Circumcision 'reduces HIV risk'

**Circumcision can reduce the rate of HIV infections among heterosexual men by around 60%, a study suggests.**

The South African study, reported in Public Library of Science Medicine, found it had a protective effect for some of the 3,280 young men involved.

Circumcision is thought to help protect against HIV because cells under the foreskin are vulnerable to the virus.

UK experts warned some circumcised men in the study still became infected and condoms offered the best protection.

HIV infection rates are lower among groups in Africa who practise circumcision, but it was not known if this was due to cultural differences.

**" There is a danger that people who have been circumcised will feel that they are fully protected from HIV when they are not "**  
Deborah Jack, National Aids Trust

When the foreskin is removed, the skin on the head of the penis becomes less sensitive and so less likely to bleed, thereby reducing the risk of infection.

Studies in Uganda and in Kenya are also investigating the link.

### **Trial stopped**

The South African trial, conducted by a team of French and South African researchers and sponsored by ANRS (the French National Agency of Research on Aids), took place in the Orange Farm area near Johannesburg, where male circumcision in adulthood is a common but not universal practice.

Just under 3,280 young, sexually active, uncircumcised, heterosexual men who took part in the study were offered the chance to be circumcised and then monitored for HIV infection.

Just under half chose to be circumcised.

The researchers planned to test all participants for HIV at three, 12 and 21 months, to see whether there was a difference in the rate of new infections between the two groups.

However, after 18 months, the number of new HIV infections in the control group was 49, compared with 20 in the treatment group.

The researchers decided at this point it would be unethical to continue the study.

It was stopped and the uncircumcised men were offered circumcision.

UNAids has said the trial found promising results, but more work needs to be done to confirm its findings and "whether or not the results have more general application."

### **'Not a condom substitute'**

Keith Alcorn, of the National Aids Manual, said: "Although this study showed that men who were circumcised were less likely to become infected with HIV, it must be stressed that circumcised men did become infected in this study, and that circumcision does not provide total protection against HIV.

"I don't think that any country will be moving towards promotion of circumcision for HIV prevention on these results alone.

"Two further studies in Kenya and Uganda have yet to be completed, and will give us more information."

Deborah Jack, chief executive of the National Aids Trust, added: "There is a danger that people who have been circumcised will feel that they are fully protected from HIV when they are not."

"We need more research and clear guidance, as circumcision can never be a substitute for condom use."

Story from BBC NEWS:  
<http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/4371384.stm>

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