

Causal diagrams - Practical

In order to focus on bias, we will ignore sampling variation for the purposes of this practical. In other words, you can assume that all sample sizes are very, very large, so that standard errors are small and confidence intervals narrow.

The practical consists of selecting the appropriate analysis to be performed for each of the scenarios listed below. You should consider the following results to appropriately address the practical:

- a. The crude OR between E and D : 1.73
- b. The OR for the association between E and D , adjusted for E*: 1.06
- c. The crude OR between E* and D: 2.00
- d. The OR the association between E* and D , adjusted for E:1.52

You wish to estimate the overall causal effect of exposure E on an outcome D.

- Think about an appropriate causal diagram for each scenario which reflects the observed dependencies/independencies in the data above.
 - When you have identified the appropriate causal diagram, check that the observed dependencies/independencies are consistent with those implied by your diagram
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Scenario I

A case-control study is conducted in order to address whether exposure to a particular non-steroidal anti-inflammatory drug during the first trimester of pregnancy causes a congenital defect (D) arising in the second trimester (D = 1 for cases, D = 0 for controls without the defect). E* denotes the use of the drug of interest during the first trimester, as self-reported by the mother 1 month postpartum. E denotes the use of the drug of interest as recorded in comprehensive, accurate medical records of 1st trimester medications. You can ignore any preconception confounders or other drug exposures.

Scenario II

The data come from an RCT. D is death over a 15 year period. Study subjects were randomly assigned to an educational intervention to encourage them to eat a low fat diet (E*=1 for intervention, E*=0 for control). Investigators subsequently measured diet accurately in all trial participants (E=1 for low fat diet). Assume the intervention has no effect on D other than through its effect on actual fat consumption E.

Scenario III

The data come from a prospective cohort study. D is all-cause mortality in a cohort of healthy male miners, all aged 25, all of whom worked underground in a variety of different mine shafts for 6 months in 1967; 40 year follow-up is complete. The aetiologic question is whether pulmonary exposure to doses of radon above a certain level causes increased mortality. For each miner, the air level of radon in his mine was measured (E*). A subject's actual exposure depends on the level of radon in the mine and the physical demands of the job. The subject's actual exposure was measured as E: 0 = below threshold of interest, 1= above. It is known that 6 months of physical exertion at age 25 has no independent effect on subsequent mortality. In considering this scenario think also of other potential confounders; Robins proposes 'silica' as a possibility.