

1. The table below describes a hypothetical case-control study that examined the relationship between prostate cancer risk and beer consumption. 5 prostate cancer cases university clinics completed a questionnaire shortly after diagnosis. Controls were recruited from patients in the surgical outpatient clinics of the same hospitals. Cases and controls completed a questionnaire about the frequency and amount of beer consumed in the last year.

| | Cases | Controls |
|-------------------------------|-------|----------|
| Non-drinkers | 51 | 88 |
| Rarely drinking beers | 53 | 101 |
| Drinking few beers often | 86 | 125 |
| Drinking beer a lot and often | 96 | 74 |
| | | |
| Total | 286 | 388 |

- a) Calculate the frequency of different levels of beer consumption for cases and controls.
What is the interpretation?

| | Cases | Controls |
|-------------------------------|-------|----------|
| Non-drinkers | 17.8% | 22.7% |
| Rarely drinking beers | 18.5% | 26.0% |
| Drinking few beers often | 30.1% | 32.2% |
| Drinking beer a lot and often | 33.6% | 19.1% |

There is a higher proportion of those who drink beer a lot and often among cases compared to controls; there is a lower proportion of non-drinkers among cases compared to control. There is a higher proportion of individuals rarely drinking beers among controls compared to cases.

- b) Calculate the odds ratio for each category of beer consumption compared to non-drinkers.
Interpret.

| | Cases | Controls | Odds | OR |
|-------------------------------|-------|----------|------|------|
| Non-drinkers | 51 | 88 | 0.58 | 1 |
| Rarely drinking beers | 53 | 101 | 0.52 | 0.91 |
| Drinking few beers often | 86 | 125 | 0.69 | 1.19 |
| Drinking beer a lot and often | 96 | 74 | 1.30 | 2.24 |

The odds of having the diagnosis of prostate cancer are lower for those who rarely drink beers compared to non-drinkers (OR = 0.91). However, there are higher odds for those that

drink few beers often (OR = 1.19) or who drink beer a lot and often (OR = 2.24) compared to non-drinkers.

c) What other information would we need?

Age, sex of participants, how long they have been drinking, other lifestyle factors: smoking, physical exercise, environmental (e.g., occupational) exposures, family history of cancer ...

d) Can the way the cases and controls were recruited affect the results? How and why?

Yes, because the sampling might not be random for cases (e.g., response bias); similarly, similarly, the controls were patients and they might have other pre-existing conditions, which might affect the rates. The reporting of beer consumption might systematically differ between controls vs cases. There might be a recall bias.

e) What other ways of recruiting probands for a similar study we can consider and what are the advantages and disadvantages?

For example:

Community sampling:

- *Advantage – useful for getting better estimates of the studied population*
- *Disadvantage – more expensive and time-consuming*

Population-based sampling

- *Advantage – provides a more representative sample of the general population.*
- *Disadvantages – even more expensive than CS and logistically challenging, harder to get enough cases*