

## Exam questions that have been used for epidemiology courses at University of Bergen

**Q1:** A case control-study wants to investigate high exposure to radiofrequency energy from mobile phones can cause lung cancer. The researchers decide to recruit patients from a pulmonary ward to try answering the question. In the ward, 12 of the admitted patients have lung cancer and 12 patients have other conditions including chronic obstructive pulmonary disease (COPD). Among the patients with lung cancer, 4 of out 12 were considered to have had a high exposure to radiofrequency energy from mobile phones. Among the patients **without** lung cancer, 8 of out 12 were considered to have had a high exposure to radiofrequency energy from mobile phones. Half of the patients in each group were included in the study group. Among these, 4 of the 4 patients with lung cancer and **high** exposure to radiofrequency energy from mobile phones were selected and 2 of the 8 patients with lung cancer and **low** exposure to radiofrequency energy from mobile phones were selected. In the group **without** lung cancer, 2 of out 8 **without** lung cancer and **high** exposure to radiofrequency energy from mobile phones were selected and 4 of the 4 patients **without** lung cancer and **low** exposure to radiofrequency energy from mobile phones were selected. Based on this they conclude that high exposure to radiofrequency energy from mobile phones is likely to cause lung cancer. Let us assume that they are wrong. Which of the following epidemiological terms can best describe the reason for this to be wrong (choose only **one** alternative which you considered most relevant)?

- a) Confounding
- b) Information bias
- c) Selection bias
- d) Reverse causality

**Q2:** A high intake of fruit and vegetable is linked with reduced risk of cardiovascular diseases and all-cause mortality. A recent meta-analysis indicate a relative risk of 0.89 (95% CI: 0.85-0.93) for all-cause mortality per 200 g/day increase in the intake of fruit and vegetables. Based on mortality statistics from the UK in 2005, the risk of dying over a 10-year period in the age range 65-74 years of age is 21% for men and 14% for women.

Assuming a linear dose-response link, which relative risk difference would you estimate between those eating 500 grams fruit and vegetables compared to those eating 100 grams per day?

- a) ~ 0.73
- b) ~ 0.79
- c) ~ 1.26
- d) ~ 1.28

**Q3:** Based on the above mentioned assumptions and assuming a linear dose-response link, what is the absolute risk reduction among men in this age group increasing fruit and vegetables consumption from 100 to 500 grams per day?

- a) ~ 1%
- b) ~ 2%
- c) ~ 4%
- d) ~ 6%

**Q4:** Based on the above mentioned assumptions and assuming a linear dose-response link, what is the absolute risk reduction among women in this age group increasing fruit and vegetables consumption from 100 to 500 grams per day?

- a) ~ 1%
- b) ~ 2%
- c) ~ 3%
- d) ~ 4%

**Q5:** Based on the above mentioned assumptions and assuming a linear dose-response link, roughly how many men in this age group would need to increase fruit and vegetables consumption from 100 to 500 grams per day to prevent one death in the period?

- a) ~ 10
- b) ~ 25
- c) ~ 50
- d) ~ 100

**Q6:** Indicate whether each of the following statements are **true** or **false**?

- a) Errors due to random variability is usually worsened by increasing the size of the study population.
- b) If a factor takes place after the studied outcome, it **could** be reverse causality.
- c) Assume that a statin (a drug reducing cholesterol) is shown to be more effective in reducing cardiovascular disease events in people with an unhealthy diet than in people with a healthy diet. The diet is then an effect modifier for the effect of the statin on cardiovascular disease events.
- d) When studying exposures considered to be harmful (such as smoking) on relatively uncommon conditions (such as less common cancers), case control-studies can be useful
- e) Assume smoking is causal for coronary heart disease and also associated with coffee drinking. If analyzing the association between coffee drinking and coronary heart disease, finding a positive association, and concluding that coffee drinking is likely to be causal for coronary heart disease, the main reason that this conclusion is probably wrong is due to what we call reverse causality.
- f) Assume that an unhealthy diet is causal for a negative lipid profile and for myocardial infarction events. Further, assume that a negative lipid profile is causal for myocardial infarction events. Adjustment for a lipid profile in an analysis on the effect of diet on myocardial infarction events can then mask/hide the extent of the true effect.

**Q7:** When increasing the sample size (e.g. by including more participants in a trial), which of the following statements are usually true:

- a) The confidence interval increases
- b) The confidence interval decreases
- c) The power increases
- d) The power decreases
- e) The standard deviation increases
- f) The number of participants experiencing the outcome(s) increases
- g) The risk of unbalanced/unsuccessful randomization decreases

**Answers to questions:**

**Q1:** c (Selection bias).

**Q2:** b ( $0.89^2 = \sim 0.79$ )

**Q3:** c ( $21\% * 0.89^2 = \sim 4\%$ )

**Q4:** c ( $14\% * 0.89^2 = \sim 3\%$ )

**Q5:** b ( $1 / 0.04 = 25$ )

**Q6:**

- a) FALSE
- b) TRUE
- c) TRUE
- d) TRUE
- e) FALSE (confounding)
- f) TRUE

**Q7:** B, C , F, G are true

Questions and answers provided by Lars T. Fadnes, questions have been used for epidemiology course exams at University of Bergen.