

1.6 Interpreting health-risk data and studies

Name: _____ Class: _____ Date: _____

Total: 23 marks

KEY WORDS confounder • correlation • causation • double-blind
• placebo

Objective

Practise statements 1.15–1.18: reading illness and mortality data, judging study design, and the discipline of separating correlation from causation.

1 Key knowledge and worked examples

■ The four questions of every health study

1. **Who was studied?** Sample size, how selected, who dropped out.
2. **What was controlled?** Matching, placebo, blinding, **confounders** such as age, smoking, wealth.
3. **What was measured, and how?** Self-report vs measured; the endpoint (illness? death? a marker?).
4. **What is claimed?** Correlation, dose–response, mechanism, or cause?

■ Correlation is not causation

Two variables can move together because one causes the other, because a third factor causes both, or by chance. Evidence for causation needs: a plausible mechanism, a dose–response pattern, timing (cause before effect), and strength/consistency across studies.

■ Worked example: percentage change in standard form

A country's diabetes cases rise from 2.4×10^6 to 3.1×10^6 . Increase = 0.7×10^6 . Percentage change = $0.7/2.4 \times 100 \approx 29\%$. Deaths per 100 000: with 7 400 deaths in a population of 3.7×10^7 , rate = $7400/370 = 20$ per 100 000 – always state the denominator unit.

2 Practice

2.1 State the difference between correlation and causation. [2]

2.2 Give two examples of confounders in a study linking coffee drinking to heart disease.[2]

2.3 A study reports “30 % of participants who took vitamin C developed colds, compared with 32 % of those who did not.” Comment on the size of this difference. [2]

3 Exam-style questions

3.1 The table shows deaths per 100 000 people from coronary heart disease in a country over four decades.

Decade	Men	Women
1980s	410	180
1990s	330	140
2000s	240	110
2010s	170	80

Calculate the percentage decrease for men between the 1980s and 2010s, compare it with the decrease for women over the same period, and suggest two explanations for the fall that a health authority could claim credit for. [6]

3.2 A newspaper headline says “Eating breakfast cereal makes children taller.” The study behind it surveyed 2 000 children aged 7–11 and found cereal eaters were on average 3 cm taller. Give three questions you would ask about the study design before accepting the causal claim, and explain how each could produce the observed association without cereal causing growth. [6]

3.3 A trial of a new statin assigns 5 000 patients randomly to statin or identical placebo; neither patient nor doctor knows which. After five years, LDL-cholesterol is 32 % lower in the statin group and heart attacks are 18 % fewer. Explain why the random assignment and double-blinding allow a causal claim here, unlike the survey in 3.2. [5]
