UNIVERSITY MEDICINE • EXERCISE SHEET

12.2 Study designs

Name: _____ Class: _____ Date: _____ **Total: 24 marks**

KEY WORDS relative risk • odds ratio

Objective

Match design to statistic; compute RR and OR.

1 Key knowledge and worked examples

■ **The rule**

Cohort samples by exposure → RR legal; case-control samples by outcome → OR only ✓: $RR = \frac{a/(a+b)}{c/(c+d)}$, $OR = ad/bc$.

■ **Worked example: two clean datasets**

Cohort 20/200 vs 10/200 → RR 2.0, attributable fraction 50 % ✓. Case-control $30 \cdot 40/(10 \cdot 20)$ → OR 6.0 ✓.

2 Practice

2.1 Which design licenses the relative risk? [3]

2.2 Exposed 30/300, unexposed 15/300 – RR? [3]

2.3 Cases: 40 exposed, 10 not; controls: 20 and 30 – OR? [3]

3 Exam-style questions

3.1 A synthetic cohort: 400 exposed (36 events) and 400 unexposed (12 events).

Compute both risks (9 % vs 3 %), the RR (3.0) and the attributable fraction among the exposed ((RR−1)/RR = 67 %) ✓. Explain what the attributable fraction claims and what it assumes (causal exposure; no confounding) ✓. [8]

3.2 A synthetic case-control of a rare outcome: among 50 cases, 30 exposed; among 50 controls, 10 exposed.

Compute the OR (30×40 / 20×10 = 6.0) ✓. Explain why RR cannot be computed (sampling by outcome fixes the 50/50 split) and why OR ≈ RR here (rare outcome: (a+b)/b ≈ b/b) ✓. [7]

Solutions

2.1

- The cohort (samples by exposure; risks estimable) ✓.

2.2

- $0.10/0.05 = \text{RR } 2.0$ ✓.

2.3

- $\text{OR} = (40 \times 30)/(10 \times 20) = 6.0$ ✓.

3.1

- Risks: $36/400 = 9$ %; $12/400 = 3$ % ✓.
- $\text{RR} = 9/3 = 3.0$ ✓.
- Attributable fraction $= (3-1)/3 = 67$ % of exposed events ✓.
- Claims: the share of exposed cases owing to exposure – assuming the exposure is causal and unconfounded ✓.

3.2

- $\text{OR} = \text{ad/bc} = (30 \times 40)/(20 \times 10) = 6.0$ ✓.
- RR illegal: the 50/50 case-control split is the researcher's choice, not the population's risks ✓.
- Rare outcome → odds ≈ risks within groups → OR ≈ RR ✓.

exercises.lol exercises.com.cn