12.1 Measuring disease: incidence and prevalence

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

KEY WORDS incidence • prevalence

Objective

Compute disease frequency with the right denominator.

1 Key knowledge and worked examples

■ **Flow and level**

Incidence 40/2,000 = 2 %/yr; prevalence 60/2,000 = 3 %; P ≈ I × duration (2 %/yr × 1.5 yr) ✓. Standardise crude rates before comparing populations with different age mixes.

■ **Worked example: three mortality denominators**

Case fatality 5/40 = 12.5 % (cases); cause-specific mortality 5/2,000 = 0.25 %/yr (population) ✓ – same deaths, different questions.

2 Practice

2.1 Define incidence and prevalence in one line each. [3]

2.2 25 new cases among 5,000 people over one year – incidence? [3]

2.3 State the prevalence–incidence relation with symbols. [3]

3 Exam-style questions

3.1 A synthetic town: 4,000 residents; 60 existing cases on survey day; 80 new cases during the year; of those 80, 12 died.

Compute point prevalence (60/4,000 = 1.5 %), annual incidence (80/4,000 = 2 %/yr) and case fatality (12/80 = 15 %) ✓. Estimate the average duration implied by P ≈ I × D and state one assumption the estimate makes (steady state) ✓. [8]

3.2 Two synthetic districts report crude annual death rates of 12.0 and 10.5 per 1,000.

Explain why the "healthier" district may simply be younger (crude rates mix risk and age structure) and outline direct standardisation (apply each district's age-specific rates to one standard population, then compare the sums) ✓. State what could still differ after standardisation (age-independent exposures) ✓. [7]

Solutions

2.1

- Incidence: new cases ÷ at-risk ÷ time. Prevalence: existing cases ÷ population at an instant ✓.

2.2

- 25/5,000 = 0.5 % per year ✓.

2.3

- P ≈ I × D (duration); steady state assumed ✓.

3.1

- Prevalence 60/4,000 = 1.5 % ✓.
- Incidence 80/4,000 = 2 %/yr ✓.
- Case fatality 12/80 = 15 % ✓.
- Duration ≈ P/I = 1.5 %/2 %/yr = 0.75 yr – assuming steady state (incidence and duration stable) ✓.

3.2

- Crude rate = Σ(age-specific rate × age share): a younger population drags the crude rate down at equal risk ✓.
- Standardise: apply both districts' age-specific rates to ONE standard population; the totals then share the age mix ✓.
- After standardisation, non-age differences remain: smoking, deprivation, care access ✓.