

Exercise walk-through

12.1

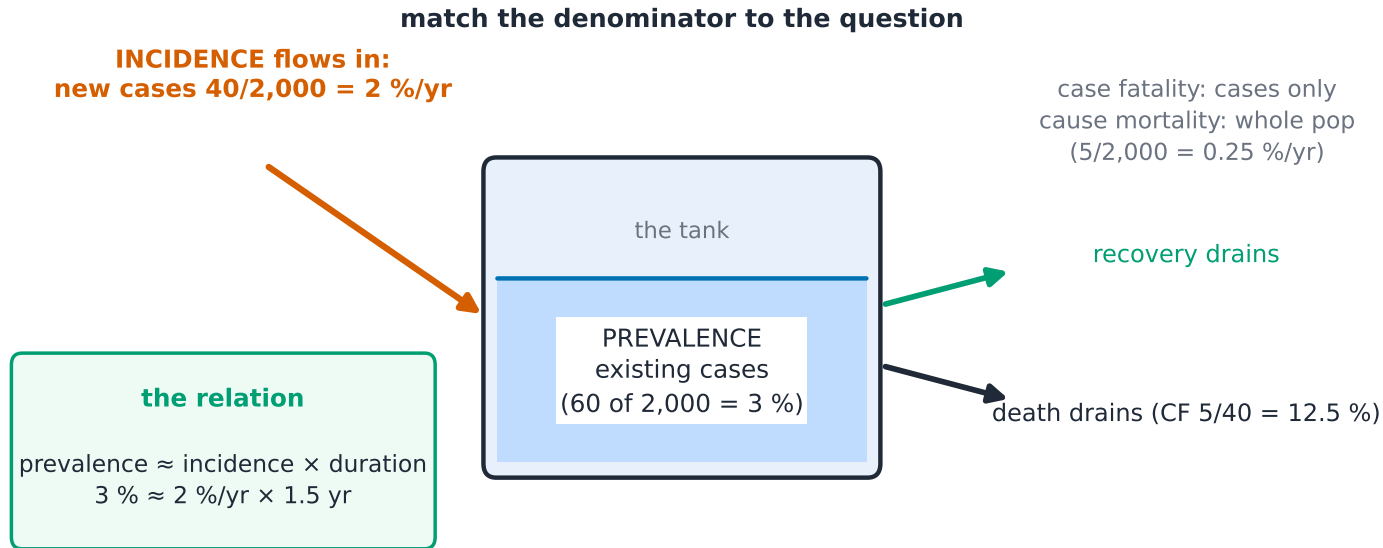
Measuring disease: incidence and prevalence

University Medicine

Measuring disease: incidence and prevalence

- 1 **Flow Incidence** $40/2,000 = 2 \text{ \%/yr}$ (new cases, people at risk, time).
- 2 **Level Prevalence** $60/2,000 = 3 \text{ \%}$ on survey day; $P \approx I \times \text{duration}$ ($2 \text{ \%/yr} \times 1.5 \text{ yr}$).
- 3 **Denominators Case fatality** $5/40 = 12.5 \text{ \%}$ (cases); cause-specific $5/2,000 = 0.25 \text{ \%/yr}$ (population); standardise before comparing crude rates.

The stock-and-flow of cases



Incidence fills the tank; cure and mortality drain it - **prevalence** is the water level.

Exercises 2.1-2.3

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]

Exercises 2.1-2.3

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

2.1

- Incidence: new cases $\div$ at-risk $\div$ time. Prevalence: existing cases $\div$ population at an instant ✓.

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

2.2

- $25/5,000 = 0.5 \%$ per year ✓.

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

2.3

- $P \approx I \times D$ (duration); steady state assumed ✓.

Exercise 3.1

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 $P \approx I \times D$ and state one assumption the estimate makes (steady state) ✓. [8]

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3.1

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

Exercise 3.2

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]

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3.2

- Crude rate = $\Sigma(\text{age-specific rate} \times \text{age share})$: 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 ✓.