S6 Health Management and Social Care Practice Paper (Paper 2)

S6 | Health Management and Social Care | Time: 75 minutes | Total: 100 marks | 24 questions

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Part A Epidemiological Measures and Age Standardisation (18 marks)

Unless stated otherwise, express rates per 100,000 population or as percentages, and show your steps.

1. A district has a mid-year population of 250,000. During the year 1,250 new cases were diagnosed and 3,000 people were still living with the disease at year end. Find (a) the incidence rate per 100,000 population; (b) the point prevalence at year end as a percentage and per 100,000. (6 marks)

2. Among 1,000 smokers 120 developed the disease; among 1,000 non-smokers 30 did. Find the relative risk, the attributable risk in percentage points and the attributable fraction in the exposed. (4 marks)

3. In a case-control study 60 of 100 cases and 20 of 100 controls reported exposure. Find the odds ratio and interpret it. (4 marks)

4. Direct standardisation: the standard population is 80% aged 0-64 and 20% aged 65 or above. In the district, 220,000 people aged 0-64 had 440 deaths and 30,000 aged 65+ had 1,200 deaths. Find the crude death rate and the age-standardised death rate per 1,000 (two decimal places) and explain the difference. (4 marks)

Part B Screening and Biostatistics (16 marks)

Give sensitivity, specificity and predictive values as percentages to one decimal place; use 95% confidence intervals with z = 1.96.

5. A person is 1.60 m tall and weighs 76.8 kg. Find the body mass index to one decimal place and classify it using Hong Kong Chinese cut-offs (23 or above overweight, 25 or above obese). (4 marks)

6. In a screening programme 10,000 people were tested and 500 had the disease. Sensitivity was 90% and specificity 95%. Find (a) the number of true positives; (b) the number of false positives; (c) the positive predictive value. (4 marks)

7. In a randomised controlled trial the two-year event rate was 20% in the control group and 14% in the treatment group. Find the absolute risk reduction in percentage points and the number needed to treat. (4 marks)

8. A sample of 100 people has a mean systolic blood pressure of 100 mmHg and a standard deviation of 15 mmHg. Find the 95% confidence interval for the mean. (4 marks)

Part C Cost-effectiveness and Budget Impact (18 marks)

Costs are in HK dollars; ICER = incremental cost / incremental QALY; the cost-effectiveness threshold is HK$150,000 per QALY.

9. Drug A costs HK$48,000 per patient per year and adds 0.4 QALY over standard care. Find (a) its incremental cost-effectiveness ratio; (b) whether it is cost-effective at the stated threshold. (6 marks)

10. Option A costs HK$300,000 and yields 6.0 QALYs; option B costs HK$500,000 and yields 7.5 QALYs. Find the ICER of switching from A to B and decide whether it is worth adopting. (4 marks)

11. A new drug costs HK$2,400 per month and the old drug HK$1,200 per month. The new drug cuts hospital admissions per patient per year from 0.5 to 0.2 and each admission costs HK$30,000. Find the net change in annual cost per patient. (4 marks)

12. If 1,000 patients switch to the new drug, find the annual budget impact and explain why budget impact matters in addition to cost-effectiveness. (4 marks)

Part D Health Behaviour and Energy Expenditure (16 marks)

Express energy expenditure in kcal (kcal = MET x body mass in kg x hours); 1 alcohol unit = 10 g pure ethanol and ethanol density is 0.789 g/mL.

13. A smoking cessation programme enrolled 1,000 people and achieved a six-month quit rate of 22%, against 8% in the control group. Find the number who quit and the relative multiple. (4 marks)

14. A person loses weight from 95 kg to 84.5 kg. Find the loss in kilograms and the percentage loss to one decimal place. (4 marks)

15. A person weighing 70 kg cycles at 3 METs for 30 minutes, five times a week. Find the energy expenditure per session and per week. (4 marks)

16. A 500 mL bottle of beer is 5% alcohol by volume. Find the mass of pure ethanol in grams and the number of alcohol units to one decimal place. (4 marks)

Part E Long-term Care and Service Planning (16 marks)

Give ratios and percentages to one decimal place; old-age dependency ratio = population aged 65 or above / population aged 15 to 64 x 100%.

17. A territory has 1,400,000 people aged 65 or above and 5,600,000 aged 15 to 64. Find the old-age dependency ratio. (4 marks)

18. Of 1,400,000 people aged 65 or above, 4% are estimated to need residential care; there are 40,000 subsidised places. Find the number of places needed and the shortfall. (4 marks)

19. A community care team handles 12,000 cases; the ideal caseload is 60 per social worker but only 160 social workers are employed. Find the ideal staffing, the actual caseload and the overload percentage. (4 marks)

20. Residential care costs HK$22,000 per month; home care costs HK$9,000 plus HK$5,000 for a day centre. Find the monthly and annual saving. (4 marks)

Part F Bioethics and Priority Setting (16 marks)

Give percentages to one decimal place; essay answers must be grounded in the principles of autonomy, beneficence, non-maleficence and justice.

21. Of 2,000 brain-dead patients, 40% had suitable organs and 45% of the families consented. Find the number of actual donors and the supply ratio against 2,500 people on the waiting list. (4 marks)

22. Three patients await the same organ with expected gains of 5, 8 and 3 QALYs and equal waiting time. Using only the principle of beneficence, who should receive it? Give one objection based on justice. (4 marks)

23. An influenza vaccination programme covers 500,000 older adults, achieves 45% uptake at HK$200 per dose and is expected to prevent 3,000 admissions costing HK$30,000 each. Find the programme cost and the net saving. (4 marks)

24. A patient refuses the treatment his doctor considers most effective. Explain how the doctor can balance respect for the decision with professional duty, giving at least two points. (4 marks)
