S6 Health Management and Social Care Practice Paper: Health Belief Model and levels of prevention, incidence and SMR, BMI and energy balance, stress and mental health screening, long-term care continuum, cost-effectiveness and herd immunity (100 marks)

Level: S6 | Subject: Health Management and Social Care | 75 minutes | 100 marks | 24 questions | answer key

Section A: Health concepts and health promotion (16 marks)

Name the concept and give an example; a name without an example scores no mark.

#	Question	Answer	Marks
1	List the four main factors in the Health Belief Model that affect whether a person takes preventive action, and give one example of each for an S6 student receiving a flu vaccination.	(1) Perceived susceptibility - classmates are catching flu; (2) perceived severity - fear of missing lessons before examinations; (3) perceived benefits - fewer sick days; (4) perceived barriers - pain, side effects, queuing. 0.5 mark for each factor and 0.5 mark for each example, 4 marks in total. Cues to action and self-efficacy are supporting factors and earn no extra mark.	4
2	Explain the three levels of prevention and give one example of each that is relevant to S6 students.	(1) Primary prevention removes risk factors before disease onset, e.g. vaccination, balanced diet and daily exercise; (2) secondary prevention detects and treats disease early, e.g. student health checks, vision and spinal screening; (3) tertiary prevention limits complications and disability, e.g. an asthma action plan and school support. 1 mark per level (0.5 name, 0.5 example), plus 1 mark for organisation.	4
3	State the five action areas of the Ottawa Charter for health promotion, and explain how a school could implement two of them.	Five areas: (1) build healthy public policy; (2) create supportive environments; (3) strengthen community action; (4) develop personal skills; (5) reorient health services. Examples: a tuck shop food policy, more water coolers and cycle parking, a health ambassador scheme, health education lessons and first aid training. 0.5 mark per area (2.5) plus 0.75 mark per implementation (1.5).	4
4	A community has 25,000 people; 5,000 smoked before an intervention and 4,000 smoked two years later. (a) Calculate the smoking rate before and after. (b) Calculate the relative decline in the smoking rate to one decimal place.	(a) Before: 5,000 / 25,000 x 100% = 20.0%; after: 4,000 / 25,000 x 100% = 16.0% (1 mark each). (b) (20.0 - 16.0) / 20.0 x 100% = 20.0% (1 mark formula, 1 mark answer). This is a relative decline; the absolute decline is 4 percentage points.	4

Section B: Epidemiology and data use (16 marks)

Show the formula, substitution and unit; state rates per 1,000 or per 100,000.

#	Question	Answer	Marks
5	A district records 300 new cases in one year with a mid-year population of 15,000. Calculate the incidence rate	Incidence = 300 / 15,000 x 1,000 = 20.0 per 1,000 (2 marks). Person-years are used because the population changes: people join, leave or die during	4

	and explain why epidemiology often uses person-years as the denominator.	follow-up, so person-years count the time each person is observed and make rates from different periods or districts comparable (2 marks).	
6	A city of 60,000 people records 120 deaths in a year. (a) Calculate the crude death rate. (b) Explain why age-standardised death rates should be used when comparing two cities.	(a) 120 / 60,000 x 100,000 = 200.0 per 100,000 (2 marks, unit required). (b) The crude rate is distorted by age structure: a city with more elderly people has a higher crude rate even with the same health care. Age standardisation applies one reference population so that only differences in risk remain (2 marks).	4
7	A screening test is used on 1,000 people: 180 of the 200 with the disease test positive, and 760 of the 800 without it test negative. Calculate sensitivity and specificity and state the public health use of a highly sensitive test.	Sensitivity = 180 / 200 x 100% = 90.0%; specificity = 760 / 800 x 100% = 95.0% (1.5 marks each). A highly sensitive test has few false negatives, so it suits first-line screening: few true cases are missed and positives go on to confirmatory testing (1 mark).	4
8	For a given operation a hospital expects 50 deaths but records 65. Calculate the standardised mortality ratio (SMR) and explain whether a value above 100 always means poor care.	SMR = 65 / 50 x 100 = 130 (2 marks). Not necessarily: SMR only shows the gap between observed and expected deaths. A more severe case mix, late referral, coding differences or random variation can all raise it, and with small numbers the confidence interval is wide, so statistical testing and case review are needed (2 marks).	4

Section C: Nutrition, body weight and lifestyle (17 marks)

Give answers to one decimal place and use the classification standard applied in Hong Kong.

#	Question	Answer	Marks
9	An S6 male student is 1.60 m tall and weighs 64 kg. (a) Calculate his BMI. (b) Classify his weight status using the Asian adult cut-offs applied in Hong Kong.	(a) BMI = 64 / (1.60 x 1.60) = 64 / 2.56 = 25.0 (2 marks, formula and unit). (b) Under the Asian adult cut-offs, 23.0-24.9 is overweight and 25.0 or above is obese, so he is in obesity class 1, not at the top of the normal range (2 marks). The WHO cut-off of 25.0 for overweight does not apply here.	4
10	A 40-year-old man weighs 70 kg and is 175 cm tall. Using Mifflin-St Jeor (male: 10 x weight in kg + 6.25 x height in cm - 5 x age + 5), calculate his basal metabolic rate and estimate daily total energy expenditure with an activity factor of 1.55.	BMR = 10 x 70 + 6.25 x 175 - 5 x 40 + 5 = 700 + 1,093.75 - 200 + 5 = 1,598.75, about 1,599 kcal (2 marks). Total expenditure = 1,598.75 x 1.55, about 2,478 kcal (2 marks, rounded to a whole number). Sustained intake above this figure leads to weight gain.	4
11	One kilogram of fat provides about 7,700 kcal. Calculate the daily energy deficit needed to lose 0.5 kg of fat per week.	Weekly deficit = 0.5 x 7,700 = 3,850 kcal (2 marks); daily deficit = 3,850 / 7 = 550 kcal (2 marks). Dieting alone is hard to sustain, so exercise and behaviour change are usually added, and 0.5-1 kg per week is the safe rate.	4
12	A drink contains 12 g of sugar per 100 g and one serving is 40 g. (a) Calculate the sugar per serving. (b) With a 2,000 kcal diet and an added sugar limit of 10% of energy, calculate the percentage of the daily limit in one serving and comment on drinking three servings a day.	(a) 12 x 40 / 100 = 4.8 g (2 marks). (b) Limit = 2,000 x 10% / 4 = 200 / 4 = 50 g; 4.8 / 50 x 100% = 9.6% (2 marks). Three servings give 14.4 g, which is 28.8% of the limit, so with other sugary foods the limit is easily exceeded, raising the risk of tooth decay, obesity and type 2 diabetes; water or unsweetened drinks are better (1 mark).	5

Section D: Stress, mental health and social support (17 marks)

Identify the limiting factors in the case and suggest workable support measures.

#	Question	Answer	Marks
13	Describe the three stages of the general adaptation syndrome and state the health effects of staying in the resistance stage for a long time.	(1) Alarm: sympathetic activation and adrenaline raise heart rate and blood glucose; (2) resistance: sustained cortisol keeps the person coping but immunity falls; (3) exhaustion: resources run out and illness follows. Prolonged resistance means chronically high cortisol, which lowers immunity, raises blood pressure and harms sleep and memory (1 mark per stage, 1 for the effect).	4
14	State the recommended sleep duration for adolescents and adults, and explain how too little sleep affects body weight and mood.	Adolescents need 8-10 hours and adults 7-9 hours a night (2 marks). Short sleep raises ghrelin and lowers leptin, increasing the appetite for sugary and fatty food; higher cortisol favours abdominal fat storage, and people are more irritable with poorer attention and mood control (2 marks).	4
15	PHQ-9 is a common depression screening tool. (a) State its total score range. (b) State the score bands for its five severity levels. (c) Explain why a high score is not a diagnosis.	(a) 0-27, from nine items scoring 0-3 each (1 mark). (b) 0-4 none, 5-9 mild, 10-14 moderate, 15-19 moderately severe, 20-27 severe (2 marks). (c) A screening tool only reflects the past two weeks and is imperfect; physical illness, medication and other mental disorders can raise the score, so a clinical assessment is needed for diagnosis (1 mark).	4
16	Case: Mrs Chan alone cares for her husband, who has limited mobility after a stroke, while working and raising two children. She now cannot sleep, cries often and refuses visits from friends. (a) Identify which types of social support she lacks. (b) Suggest three specific support measures and explain what each does.	(a) Emotional support (no one to talk to, refuses visits), instrumental support (no help with care and housework), informational support (unfamiliar with stroke rehabilitation and community resources) and appraisal support (no affirmation) (2 marks). (b) Apply for day respite or home care to share the caring load; refer to a social worker or family service centre for counselling and a carer support group; provide rehabilitation and caring-skills information plus carer allowance channels. 1 mark each with its purpose, 5 marks in total.	5

Section E: Long-term care and community support services (17 marks)

Use the service continuum to justify transfer from home to residential care.

#	Question	Answer	Marks
17	Use the service continuum to describe the three tiers of long-term care from home to residential care, and state common reasons for moving from one tier to the next.	(1) Home-based: home care, meals and outreach rehabilitation for those largely independent; (2) community-based: day care centres and respite for people needing daytime supervision but able to return home; (3) residential: care-and-attention homes and nursing homes for marked functional decline or 24-hour nursing. Moves are triggered by falling physical or cognitive function, an unsafe home, or the death or illness of the main carer (1 mark per tier, 1 for reasons).	4
18	An older adult holds a monthly community care service voucher worth $8,000; the service costs $100	(a) 8,000 / 100 = 80 hours (1 mark). (b) Shortfall = 120 - 80 = 40 hours (1 mark); 40 / 120 x 100% = 33.3% (2 marks). About one third of the need is unfunded, so	4

	per hour and 120 hours are needed each month. (a) Calculate the hours the voucher buys. (b) Calculate the shortfall in hours and the shortfall as a percentage of need to one decimal place.	families must pay the difference or seek other assistance.	
19	In a district 1,200 older people apply for subsidised residential places and 300 places exist. (a) Calculate the ratio of applicants to places. (b) Explain why community care must still be developed during the wait.	(a) 1,200 / 300 = 4.0, so four applicants compete for each place (2 marks). (b) The wait can last years while function keeps declining; community care and respite maintain quality of life at home, avoid unnecessary admissions and relieve families (2 marks).	4
20	Describe the four main steps of case management and, using the discharge of an older stroke patient, explain why discharge planning must start while the patient is still in hospital.	Four steps: (1) identification and referral; (2) holistic assessment of health, function, home and carer capacity; (3) care planning and service coordination; (4) monitoring and review (2 marks). Planning must start early because home modification, hiring a carer and subsidy applications take time; starting early avoids a blocked discharge or readmission and lets the patient and family adapt and take part in decisions (3 marks).	5

Section F: Health care system, cost-effectiveness and environmental health (17 marks)

Compare both cost and outcome, and note the limits of the decision.

#	Question	Answer	Marks
21	Compare the roles of primary, secondary and tertiary care with one example each, and explain why strengthening primary care relieves pressure on hospitals.	(1) Primary care: first contact, continuous and preventive, e.g. family doctors and district health centres; (2) secondary care: specialist clinics and acute admission, e.g. cardiology clinic; (3) tertiary care: highly specialised treatment and rehabilitation, e.g. transplant and stroke rehabilitation. Stronger primary care controls hypertension and diabetes earlier, cutting emergency attendance and admissions and keeping stable patients in the community (1 mark per tier, 1 for the explanation).	4
22	Programme A costs $500,000 for 10 QALYs; programme B costs $300,000 for 8 QALYs. Calculate the incremental cost-effectiveness ratio (ICER) and explain how it is used when resources are limited.	ICER = (500,000 - 300,000) / (10 - 8) = 200,000 / 2 = $100,000 per additional QALY (2 marks). It is compared with other programmes and a threshold: below the threshold the programme is usually judged worth funding. Disease burden, equity, patient preference and the budget must also be weighed, so the figure is not used alone (2 marks).	4
23	An infectious disease has an R0 of 3. (a) Calculate the minimum vaccination coverage needed for herd immunity. (b) Explain why a higher coverage is usually needed in practice.	(a) 1 - 1 / 3 = 1 - 0.333 = 0.667, that is 66.7% (2 marks). (b) Vaccine efficacy is usually below 100%, immunity may wane, populations are not perfectly mixed and some people cannot be vaccinated, so higher coverage is needed to fill these gaps (2 marks).	4
24	A tap water sample from an estate contains 15 micrograms of lead per litre against a standard of 10 micrograms per litre. (a) Calculate the percentage exceedance. (b)	(a) (15 - 10) / 10 x 100% = 50% (1 mark). (b) Lead impairs neurodevelopment, lowering intelligence and attention and causing learning and behaviour problems; young children absorb more than adults (2 marks). Measures: use tested water points or bottled water; replace lead	5

	State the main health effects of lead exposure in children and suggest three remedial measures.	pipes and fit filters; test and follow up children blood lead levels while publishing results and strengthening monitoring (about 0.67 mark each, 5 marks in total).	