

**UNIVERSITY OF WALES COLLEGE OF MEDICINE  
MASTER OF PUBLIC HEALTH  
WEDNESDAY, 13TH MAY 1998 : 10 - 1**

**PAPER 1A**

**PUBLIC HEALTH POLICY**

You should answer **FOUR** questions

**One** from Section A: Determinants of Health

**One** from Section B: Health Economics

**Two** from Section C: Health Policy and Management

Each question will be marked out of 25.

Credit will be given for evidence of critical thinking and for answers which are illustrated by reference to the literature and, where relevant, to your own experience.

**PLEASE USE A SEPARATE ANSWER BOOK FOR EACH QUESTION**

## **Section A: Determinants of Health**

### Answer **One** Question

1. Discuss the contribution of political factors to the recognition of a public health problem. Illustrate your answer with specific examples.
2. Does the aim of maximising total health status conflict with the goal of promoting equity?

## **Section B: Health Economics**

### Answer **One** Question

3. Discuss the advantages and disadvantages of using cost utility analysis as opposed to cost effectiveness analysis when conducting an economic appraisal.
4. Defend the economist's contention that health care rationing is unavoidable no matter what health care system is in place or how much is spent on it.

## **Section C: Health Policy and Management**

### Answer **Two** Questions

5. Waiting lists appear to be an integral part of the UK National Health Service. Explain why waiting lists occur and what the UK should do about them. Why are they not necessarily an important issue in other countries.
6. 'Quality in health services can only be bought at a price'. Comment on this statement using examples from health services with which you are familiar. Include brief comments on the measurement of quality in health care.
7. 'The medium sized district general hospital has no future'. Give the main arguments for and against this statement giving what evidence you know of and the strength of the evidence cited.
8. Health services are the least important of the factors which determine the health of a nation. Discuss this statement with the evidence for and against it.

UNIVERSITY OF WALES COLLEGE OF MEDICINE

Division of Public Health

MPH Core Course in Statistics 1997/98

Examination paper, Wednesday 13 May 1998.

You should attempt *all six* questions in this paper for which 2 hours are allowed. If you find you are spending a lot of time on one question you are advised to move on to the next one - to guide you in this the marks available for each question are indicated. We suggest you use 10 minutes to read the paper at the start, and reserve 10 minutes to check at the end - then for each question or part of a question, the number of marks allocated indicates how many minutes you should expect to spend on it. Note that a substantial proportion of marks are awarded for clear interpretation or comments. There is *no* credit for performing calculations other than those explicitly requested; for those that are required, you may use a calculator, but you should include details of your working including relevant intermediate steps. Standard statistical tables are appended, together with a nomogram and some useful formulae.

1. The following figures are extracted from the current life table for females, England & Wales 1996.

Age in years	$l_x$
0	10,000
1	9,937
2	9,931
...	...
10	9,917
...	...
80	5,561
...	...

(a) For two girls reaching age 10 in 1996, estimate the probability that they will both reach age 80.

[4 marks]

(b) Explain what assumptions are made in performing this calculation. What difference would it make if you were told they were a pair of twins?

[7 marks]

**[11 marks]**

**total]**

2. (a) Explain what is meant by

- (i) Type I error.
- (ii) Type II error.
- (iii) Statistical power.

[3 marks]

(b) Drug A reduces cholesterol level by 1.2 units on average. It is believed that drug B may reduce cholesterol level by around 1.5 units, and it is proposed to conduct a randomised controlled clinical trial to compare the two drugs. Previous studies suggest that the SD expressing variation between different patients' reductions in cholesterol on the same drug is 0.8 units.

How many subjects should be recruited to the study to yield a power 90% to detect a difference of 0.3 units?

[3 marks]

(c) What sample size is needed to estimate the mean reduction in cholesterol on drug B within 0.2 units with 95% confidence?

[3 marks]

(d) About 10% of patients receiving drug B develop giddiness. What sample size would be needed to estimate this proportion within 5% with 95% confidence?

[4 marks]

**[13 marks]**

**total]**

3. The GACPAT test (Immunoglobulin G antibody capture particle adherence test) was evaluated on saliva samples from 75 subjects, of whom 17 were identified as HIV positive according to a definitive serum test.

		S e r u m		Total
		+ve	-ve	
GACPAT	+ve	17	3	20
	-ve	0	55	55
Total		17	58	75

(a) Define and calculate sensitivity, specificity, positive and negative predictive value for the above data. [8 marks]

(b) Explain why the standard method of calculating confidence intervals for proportions is inappropriate to the above data.

[2 marks]

(c) Estimate the positive predictive value that would apply if the test was applied to a population in which the prevalence of HIV is 10%. Comment on how this compares with what you calculated in part (a).

[6 marks]

**[16**

**marks total]**

4. In a study of acute lower respiratory tract infections of children in Burkina Faso, the following results were reported.

	No. of episodes	Mean duration (days)	SD
Dry season	105	12.6	9.4
Rainy season	46	9.4	4.1

(a) Perform an unpaired t-test to compare the mean duration of infection between the dry and rainy seasons. State whether the null hypothesis should be rejected, and the steps leading to this decision.

[11 marks]

(b) Calculate and interpret a 95% confidence interval for the difference between the two means.

[4 marks]

(c) Identify any assumptions you make, and whether they are critically important.

[5 marks]

(d) Would it be reasonable to infer that 84% of infections in the dry season have duration less than 22 days, and why?

[2 marks]

**[22 marks]**

**total]**

5. Two studies were performed in Hong Kong in 1978/79 and 1988/89 independently to determine proportions of individuals who had been exposed to hepatitis A infection. The following results were obtained:

Age group	1978 / 79		1988 / 89		Comparison	
	Number tested	% positive	Number tested	% positive	Chi-square	p-value
0 - 9	101	12.9	235	6.8	3.29	0.05 < p < 0.1
10 - 19	105	44.8	179	11.2	41.42	< 0.001
20 - 29	44	75.0	160	58.8	3.88	< 0.05
30 - 39	41	82.9	266	83.5	0.01	> 0.1
40 - 49	41	90.2	90	91.1	0.03	> 0.1
50 and above	30	90.0	98	93.9	0.53	> 0.1

(a) Show briefly how the chi-square value of 3.29 for the 0-9 age group is calculated, and how its p-value is obtained. State whether the null hypothesis should be rejected, and the steps leading to this decision.

[12 marks]

(b) Explain what should be inferred from the results presented above.

[6 marks]

**[18 marks]**

**total]**

6. In a study of nutritional status and diarrhoea in Bolivia, 86 children were identified as cases, having weight for height below the 2½ centile based on international standards. 86 children of similar sex and age, with weight for height above the 2½ centile, were identified as controls. The association between number of diarrhoeal episodes in the past year and nutritional status was reported as follows.

Diarrhoea episodes	Cases	Controls	Total
4 or more	27	19	46
0 to 3	59	67	126
Total	86	86	172

(a) Calculate the odds ratio for the association between number of diarrhoeal episodes and nutritional status, together with a 95% confidence interval.

[10 marks]

(b) What should be inferred from these results?

[5 marks]

(c) Suggest how the investigator could have presented and analysed the data in such a way as to have a better prospect of detecting an association, and why.

[5 marks]

**[20 marks total]**

*Some useful formulae.*

Standard error of  $p$   $\sqrt{p(1-p) / n}$

Standard error of  $\bar{X}_1 - \bar{X}_2$   $\sqrt{s_1^2 / n_1 + s_2^2 / n_2}$

Standard error of  $p_1 - p_2$   $\sqrt{\frac{p_1(1-p_1)}{n_1} + \frac{p_2(1-p_2)}{n_2}}$

Standard error of  $\log_e(OR)$   $\sqrt{1/a + 1/b + 1/c + 1/d}$

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**Paper 1C**

**EPIDEMIOLOGY**

**(including demography, social research methods, and public health and environmental issues)**

You should answer **FOUR** questions: equal marks are given to each question.

**TWO from Section A:**

**ONE from Section B:**

**ONE from Section C:**

Credit will be given for evidence of critical thinking and for answers which are illustrated by reference to the literature and, where relevant, to your own experience.

**PLEASE USE A SEPARATE ANSWER BOOK FOR EACH QUESTION**

## **SECTION A: (Epidemiology)**

### **Answer TWO questions**

1. Outline the principles of a case control study and explain why matching is employed. Discuss the problems that can arise.
2. Outline the requirements for an effective screening programme, explaining their rationale and illustrating your answer with one example.
3. Design a surveillance system for either:-
  - a. a new haemorrhagic fever in a developing country.OR
  - b. accidental poisoning in children in a country of your choice.
4. The terms 'surveillance', 'surveys' and 'research' are often used synonymously. Distinguish between them.
5. Compare and contrast:
  - i. epidemic and endemic
  - ii. incidence and prevalence
  - iii. Koch's postulates and Bradford Hill's criteria for causation

## **SECTION B (Demography)**

### **Answer ONE Question**

6. Describe a population pyramid and explain how and why population pyramids in developed and developing countries differ.
7. Describe how the demographic characteristics of a population may be measured. Why do we need to know these characteristics.
8. Define total fertility ratio (TFR). How is it measured? What social factors are responsible for changes in it?

## **SECTION C (Social Research Methods)**

### **Answer ONE Question**

9. Design a study to evaluate the impact of improving housing conditions in a deprived urban area.
10. Discuss the ethics of undertaking clinical research that would be illegal in Britain, in a developing country.
11. Discuss the relative merits of using a questionnaire or structured observations as methods to study EITHER hygiene behaviour OR nutrition behaviour.