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University Examinations 2024/2025

FIRST YEAR, FIRST SEMESTER EXAMINATION FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN EPIDEMIOLOGY AND PUBLIC HEALTH

HPE/HPP 8113 EPIDEMIOLOGIC PRINCIPLES FOR HEALTH RESEARCH/EPIDEMIOLOGY

DATE: JANUARY 2025 **TIME: 2 HOURS**

INSTRUCTIONS:

1. **SECTION A: A**nswer all Question
2. **SECTION B:** Answer any 3 Questions

SDECTION A: (30 MARKS)

QUESTION ONE

a) i. Discuss the following biases that can occur in case-control studies, give an example of each, and describe what you can do to control them:

1) Selection bias
2) Information bias
3) Confounding
4) Misclassification

ii. Describe Effect Modification and how you test for it.

iii. Describe the different types of matching that you can use in case-control studies, and advantages and disadvantages of matching. What is "over-matching"? (10 Marks)

b) Altogether 5,000 subjects were enrolled in a cohort study with the follow-up of 4 years. During the 4-year follow-up 15 of the subjects died.

i) Calculate Cumulative incidence based of the figures given above.

ii) Calculate person-time Incidence density based on the data given in the table below. (8 Marks)

Year	Follow-up time person-years	Number of Deaths	Incidence /1000
1	4900	1	
2	4600	3	
3	4100	4	
4	3500	7	
Total	17100	15	

c). It has been hypothesized that the children of mothers over 30 years of age have an increased risk of juvenile onset (type 1) diabetes. Describe how this could be studied using:

i) Case-control study

ii) Cohort study.

iii) Please include in your description the merits and demerits of each study design to explore this particular hypothesis. (6 Marks)

d). Several weeks ago a tanker lorry carrying chemical waste crashed in a small town in a rural region of the country, and a large quantity of noxious chemicals were spilled. A plume of gas hung over the town for O several hours.

Since the accident, the local clinical officer has reported an apparent increase in bleeding disorders in local residents. Outline a study to investigate the relationship between the event and the reported health problems. (6 Marks)

SECTION B

QUESTION TWO (10 MARKS)

A new screening test for cancer has been developed. The test has a sensitivity of 99% and a specificity of 95%, and a person with a positive screening test will have to undergo several expensive additional tests to confirm the diagnosis. Discuss the relative value of this test in 2 different populations: one where the prevalence of cancer is 1/1000 and another where the prevalence of cancer is 1/10.

QUESTION THREE (10 MARKS)

Discuss the major classifications of epidemiological study designs and their application during investigations.

QUESTION FOUR (10 MARKS)

The following analysis shows two different logistic regression models for a hypothetical case-control study that looked at the relationship of factors A, B, and C to the occurrence of disease Y.

Mode/ 1

Term	OR	95% Cl		Coefficient	S.E.	statistic	P-Value
A	0.0742	0.0205	0.2692	-2.6007	0.6574	-3.9560	0.0001
Constant				-0.4435	0.9005	-0.4925	0.6224

a) Describe the meanings of the following column headings: OR, 95% C l, Coefficient, S.E., X^2-statistic and P-Value.

Mode/ 2

Term	OR	95% Cl		Coefficient	S.E.	statistic	P-Value
A	0.0839	0.0216	0.3266	-2.4781	0.6934	-3.5735	0.0004
B	7.0202	2.5547	19.2913	1.9488	0.5158	3.7785	0.0002
Constant				-0.8334	0.9734	-0.8562	0.3919

a) Factor B has been added to the model. Should it be kept in the model, or is Model better? Explain how you came to your conclusion.

c) Compare the effects of the two factors, A and B, on Disease Y.

QUESTION FIVE (10 MARKS)

Discuss ways of controlling for Biases and confounding in epidemiological studies.