NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCE
DEPARTMENT OF ENVIRONMENTAL SCIENCE AND HEALTH
BACHELOR OF SCIENCE HONOURS DEGREE
FINAL EXAMINATIONS

ENVIRONMENTAL EPIDEMIOLOGY: ESH 4114

December 2011   Time allowed: 3 Hours   Total Marks:100

INSTRUCTIONS:

Answer any FOUR questions. Each question carries 25 marks.

Question 1

a) Discuss the factors that influence observed prevalence rate.   **(10 marks)**

b) Available information can be used in epidemiological studies. Discuss the prons and cons of using such data.   **(15 marks)**

Question 2

a) Explain the main types of errors in epidemiological studies.   **(12 marks)**

b) Discuss ways in which each type of error can be reduced.   **(13 marks)**

Question 3

 a) During an outbreak of severe neurogical disease of unknown cause the families of the patients suggest that the cause is adulterated cooking oil of a particular brand. Considering the criteria for causality what would you demonstrate first?   **(7 marks)**

b) Design a suitable study that you would use to establish a cause effect   relationship between the disease and the adulterated cooking oil.   **(10 marks)**

c) At what stage would you intervene if evidence shows that the cooking oil might be the cause?   **(8 marks)**

Question 4

a) The following is based on the preliminary report of a study designed to assess the value of aspirin in the prevention of coronary heart disease published in the *New England journal of medicine:*

The Physician's Health Study is a randomized double-blind, placebo-controlled trial testing whether 325mg of asprin taken every other day reduces mortality from cardiovascular disease. The potentially eligible participants in the study were all male physicians 40 to 84 years of age residing in the United states at the beginning of the study in 1982. Letters of invitation, informed-consent forms and baseline questionares were mailed to 261 248 such physicians identified from information on a computer tape obtained from the American Medical Association. By 31 December 1983, 112 528 had responded, of whom 59 285 were willing to participate in the trial. A large number were excluded during the enrolment phase because of poor compliance (judged by pill counts); physicians with a history of gastric bleeding and intolerance to aspirin were also excluded. 11 037 physicians were assigned at random to receive active aspirin and 11 034 to receive placebo.

This study found that aspirin had a strong protective effect against non-fatal myocardial infarction. Would you be happy to prescribe aspirin for the prevention of coronary heart disease? **(12 marks)**

b) The following extract is taken from a paper on asthma mortality in New Zealand, published in the Lancet (Wilson et al, 1981):

Abstract

An apparent increase in young people dying suddenly from acute asthma has been noted in the past 2 years in Auckland. 22 fatal cases were reviewed. Prescribing habits for asthma therapy have been changing in New Zealand, with a considerable increase in the use of oral theophylline drugs, particularly sustained-release preparations, which in many patients have replaced inhaled steroids and cromoglycate. It is suggested that there may be an additive toxicity between theophylline and inhaled B2-agonists at high doses which produces cardiac arrest.

Methods

Details of deaths from asthma were obtained from the coroner's pathologist, the Auckland Asthma Society, general practitioners, and from the intensive and critical care wards of Auckland Hospital. The doctors and relatives of the patients were contacted and descriptions of mode of death and the pattern of drug administration

were obtained. Statistical information on fatal asthma cases in New Zealand in the years 1974-78 was obtained from the New Zealand Department of Health. Necropsies had been performed on the 8 patients referred to the coroner.

Taking into consideration the methods used, would you agree with the suggestion that a toxic drug interaction was leading to an increased risk of death?   **(13 marks)**

Question 5

a) **Table 1.1** indicates that there were over 40 times more cholera cases in one district than in another. Did this reflect the risk of catching cholera in each district? Explain your answer.   **(9 marks)**

Table 1.1: Death from cholera in districts of London supplied by two water companies, 8 July to 26 August 1854:

Water supply Company	Population 1851	No. of deaths from cholera	Cholera death rate per 1000 population
Southwark	167 654	844	0.5
Lambeth	19 133	18	0.9
Source: Snow 1855			

b) How could the role of water supply in causing deaths from cholera be tested further?

(8 marks)

c) What does Table 1.2 tell us about the contribution of asbestos exposure and smoking to the risk of cancer.   **(8 marks)**

Table 1.2: Age-standardized lung cancer death rates (per 100 000 population) in relation to cigarette smoking and occupational exposure to asbestors dust:

Exposure to asbestors	History of cigarette smoking	Lung cancer death rate pr 100 000
No	No	11
Yes	No	58
No	Yes	123
Yes	Yes	602

Source: Hammond et al. 1979

Question 6

a) What is meant by the healthy worker effect and how can it introduce bias in occupational epidemiological studies? **(8 marks)**

b) You are a public health official in a medium sized city with a number of large industrial enterprises. The workers in these enterprises are provided with medical care through a uniform insurance system which means that all current and retired workers are likely to get health care from the same hospital. A hospital doctor calls you and expresses concern about the large number of lung cancers among the workers. Design an initial study to investigate potential associations between occupational exposures and increased risk of lung cancer. **(17 Marks)**

(End of question paper)