UNIVERSITY OF SWAZILAND

FACULTY OF HEALTH SCIENCES

SUPPLEMENTARY EXAMINATION PAPER – JULY, 2014

TITLE OF PAPER	:	FUNDAMENTALS OF EPIDEMIOLOGY
COURSE CODE	:	EHM 203
TIME	:	2 HOURS
MARKS	:	80

INSTRUCTIONS	:	ANSWER **QUESTION 1** AND **ANY THREE** OTHER QUESTIONS
	:	EACH QUESTION CARRIES 20 MARKS
	:	NO FORM OF PAPER SHOULD BE BROUGHT INTO NOR TAKEN OUT OF THE EXAMINATION ROOM
	:	BEGIN THE ANSWER TO EACH QUESTION ON A SEPARATE SHEET OF PAPER
	:	CALCULATORS MAY BE USED BUT THEY MUST BE THE SILENT TYPE
	:	ALL CALCULATIONS/WORK-OUT DETAILS SHOULD BE SUBMITTED WITH YOUR ANSWER SHEET

This question paper consists of 7 printed pages including this one

QUESTION 1 MULTIPLE CHOICE

Write the letter that corresponds to your chosen answer among those suggested for each sub-question e.g. xv. D

i. Cases of tuberculosis were identified by the Swaziland National Tuberculosis Control Programme from the country TB register. Which one of the following categories of study design best describes this method of case finding?
   A. Prospective follow-up
   B. Passive surveillance
   C. Cross-sectional survey
   D. Hospital-based surveillance
   E. Active surveillance

ii. The probability of a person having the disease when the test is positive
   A. Sensitivity
   B. Specificity
   C. Positive predictive value
   D. Negative predictive value
   E. None of the above

iii. In the study of an outbreak of an infectious disease, plotting an epidemic curve is useful because:
   A. It helps to determine what type of outbreak (e.g. single-source, person-to-person) has occurred
   B. It shows whether herd immunity has occurred
   C. It helps to determine the median incubation period
   D. A and C
   E. A, B and C

iv. The mortality rate from disease A in City X is 75 per 100 000 in persons 65 to 69 years old. The mortality rate from the same disease in City Y is 150 per 100 000 in persons 65 and 69 years old. The inference that disease A is two times more prevalent in persons 65 to 69 years old in City Y than it is in persons 65 to 69 years old in City X is:
   A. correct
   B. incorrect, because of failure to distinguish between prevalence and mortality
   C. incorrect, because of failure to adjust for differences in age distribution
   D. incorrect, because of failure to distinguish between period and point prevalence
   E. incorrect, because a proportion is used when a rate is required to support the inference

v. The major purpose of random assignment in a clinical trial is to:
   A. help ensure that study subjects are representative of the general population
   B. facilitate double blinding (masking)
   C. facilitate the measurement of outcome variables
   D. ensure that the study groups have comparable baseline characteristics

E. reduce selection bias in the allocation of treatment

vi. Several studies have found that approximately 85% of cases of lung cancer are due to cigarette smoking. This measure is an example of:
   A. an incidence rate
   B. an attributable risk
   C. a relative risk
   D. a prevalence risk
   E. a proportionate mortality ratio

Questions vii and viii are based on the following information.

Factors A, B and C can each individually cause a certain disease without the other two factors, but only when followed by exposure to factor X. Exposure to factor X alone is not followed by the disease, but the disease never occurs in the absence of exposure to factor X.

vii. Factor X is:
   A. a necessary and sufficient cause
   B. a necessary, but not sufficient cause
   C. a sufficient, but not necessary cause
   D. neither necessary nor sufficient
   E. None of the above

viii. Factor A is:
   A. a necessary and sufficient cause
   B. a necessary, but not sufficient cause
   C. a sufficient, but not necessary cause
   D. neither necessary nor sufficient
   E. None of the above

ix. If an association is found between the incidence of a disease and a certain genetically determined characteristic:
   A. the disease is clearly genetic in origin
   B. genetic factors are at least implicated in all cases of the diseases
   C. genetic factors are at implicated in at least some cases of the disease
   D. a role for environmental factors is excluded
   E. expression of the disease is likely to be unavoidable

x. The Environmental Health department of the Ministry of Health engages a community in spring protection activities. This is an example of:
   A. a primary prevention strategy
   B. a secondary prevention strategy
   C. a tertiary prevention strategy
   D. It is not a prevention strategy
   E. This is neither a primary, secondary or tertiary strategy

QUESTION 2

a. Write **T** (for true) and **F** (for false) in each of the statements below: (5)
   i. The two standard categories in descriptive epidemiology are sex and age.
   ii. In epidemiology of disease, the latent period is the time from infection until the time of appearance of the first signs and symptoms of the disease.
   iii. Zoonosis are infections that occur in animals only.
   iv. Transmission of disease agents through sneezes or coughs is a direct method of transmission.
   v. An index case is the first case to be discovered by the health care system during an outbreak.

b. Explain how epidemiology can be used in each of the following undertakings:
   i. Litigation (3)
   ii. Health services planning (3)

c. Outbreaks and epidemics have to be adequately described before commencement of control.
   i. Explain why it is important to describe epidemics prior to application of control measures. (4)
   ii. List three attributes by which epidemics are commonly described. (3)
   iii. Sometimes epidemics are described using epidemic curves. What purpose do epidemic curves serve in the description of epidemics? (2)

[20 marks]

QUESTION 3

a. Define the following study designs:
   i. Cohort (2)
   ii. Cross-sectional (2)

b. Write down two advantages of cohort study designs over cross-sectional. (2)

c. Write down two advantages of cross-sectional study designs over cohort. (2)

d. In a study of Human Immunodeficiency Virus (HIV) infection and tuberculosis (TB) in New York, 513 intravenous drug users were initially tested for HIV antibody. In total, 215 were HIV-positive and 298 were HIV-negative. They were then followed to identify any signs of active tuberculosis for a period of 2 years. The results of the study were as follows:

	Developed TB	No TB	Total
HIV-seropositive initially	8	207	215
HIV-seronegative originally	0	298	298
Total	**8**	**505**	**513**

   i. Is this a cross-sectional or cohort study design? Explain your answer. (2)
   ii. Why were the drug users initially tested for HIV antibody? (2)
   iii. Why did the researchers follow the participants for two years? (2)

iv. Using the information above, calculate an appropriate epidemiologic measure to determine the association between HIV infection and development of TB. (6)

[20 marks]

QUESTION 4

a. Define what is meant by the term 'outbreak'. (1)

b. Write down two characteristics commonly associated with food-borne outbreaks or food-poisoning. (2)

c. Fifteen people had dinner together. Within 24 hours, five of them developed gastroenteritis. The dinner had consisted of several courses and food items, and the participants had not all eaten the same items. All the guests were sent a list of the food items that had been served and asked to indicate what they had eaten. The table below was developed from their responses:

Food item	Gastroenteritis	No gastroenteritis	TOTAL
Quinche	2	8	10
Cheesecake	4	1	5
Swiss roll	3	4	7
Chocolate cake	1	2	3
Cheese dip	4	7	11

i. Calculate the relative risk of gastroenteritis associated with each food type. (10)

ii. Which food item(s) do you think were associated with gastroenteritis? (2)

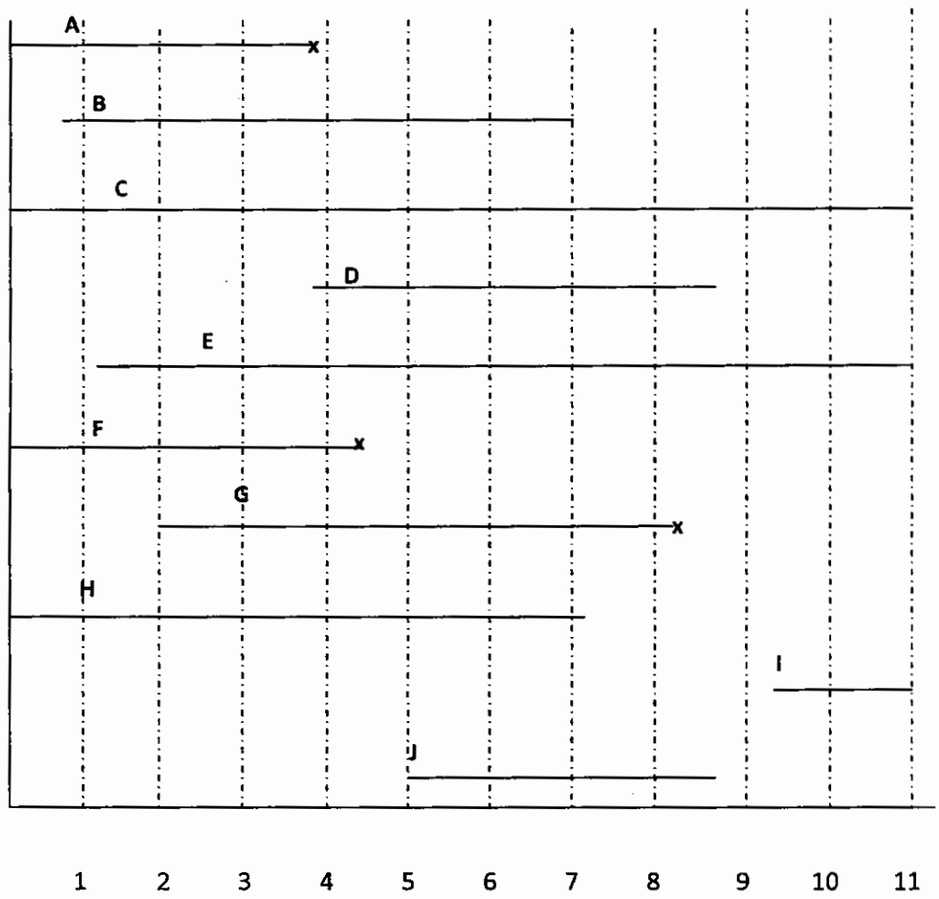
iii. Why was one person ill who had not eaten cheesecake? (3)

iv. Why was one person well who had eaten cheesecake? (2)

[20marks]

QUESTION 5

Given below is a schematic representation of a study of 10 people who are at risk for some disease. Each line from A to J represents the monitoring period for a patient.



x – participant diagnosed with disease

a. What study design is illustrated in the diagram?
   Give reasons for your answer. (2)
b. Write short notes about subjects A, C, and I (3)
c. Give 3 possibilities of what could have happened to subject B at the end of the study period. (3)
d. Calculate the prevalence rate of the disease on the 4th and on the 5th years (4)
e. Calculate the incidence rate of the disease in the 11-year study period. (2)
f. What is the total number of person-years contributed by the subjects in the study period? (3)

g. Use the person-years obtained in (vii) to calculate the prevalence rate of the disease in the 11 year study period. (3)

[20 marks]

QUESTION 6

a. In a case-control study, coffee drinking was observed to be associated with the risk of cancer of the pancreas. The importance of this association was disputed because it was noted that coffee drinking was correlated with cigarette smoking and cigarette smoking was also associated with cancer of the pancreas. So, cigarette smoking may have confounded the observed association between coffee drinking and cancer of the pancreas. The observed odds of exposure to coffee among all cases and controls are shown in the table below:

Odds of exposure to coffee among all cases and controls

Exposure	Cases	Controls	Total
Coffee drinkers	450	600	1 050
Non-coffee drinkers	300	750	1 050
Total	**750**	**1 350**	**2 100**

i. What is the study design described above. Explain your answer. (4)

ii. Calculate the odds ratio of exposure to coffee in cases and controls. (6)

b. Because the researchers in this study believed that coffee drinking and cigarette smoking might be correlated, and also that cigarette smoking was associated with cancer of the pancreas, they calculated the odds ratio of exposure among smokers and non-smokers separately.

Odds of exposure to coffee in cases and controls stratified by exposure to smoking

	Smokers		*Non-Smokers*		
Exposure	*Cases*	*Controls*	*Cases*	*Controls*	*Total*
Coffee drinkers	400	300	50	300	1 050
Non-coffee drinkers	200	150	100	600	1 050
Total	**600**	**450**	**150**	**900**	**2 100**

i. What is the odds ratio of exposure to coffee compared to controls among smokers and non-smokers? (4)

ii. What is our inference regarding the association between smoking and coffee drinking, and between smoking and cancer of the pancreas? (2)

iii. What is matching and why is important for this kind of studies. (4)

[20 marks]