

UNIVERSITY OF SWAZILAND
FACULTY OF HEALTH SCIENCES

SUPPLEMENTARY EXAMINATION PAPER – JULY, 2013

TITLE OF PAPER : FUNDAMENTALS OF EPIDEMIOLOGY
COURSE CODE : EHM 203
TIME : 2 HOURS
MARKS : 100

INSTRUCTIONS : ANSWER QUESTION 1 AND ANY FOUR
QUESTIONS
:
: EACH QUESTION IS 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

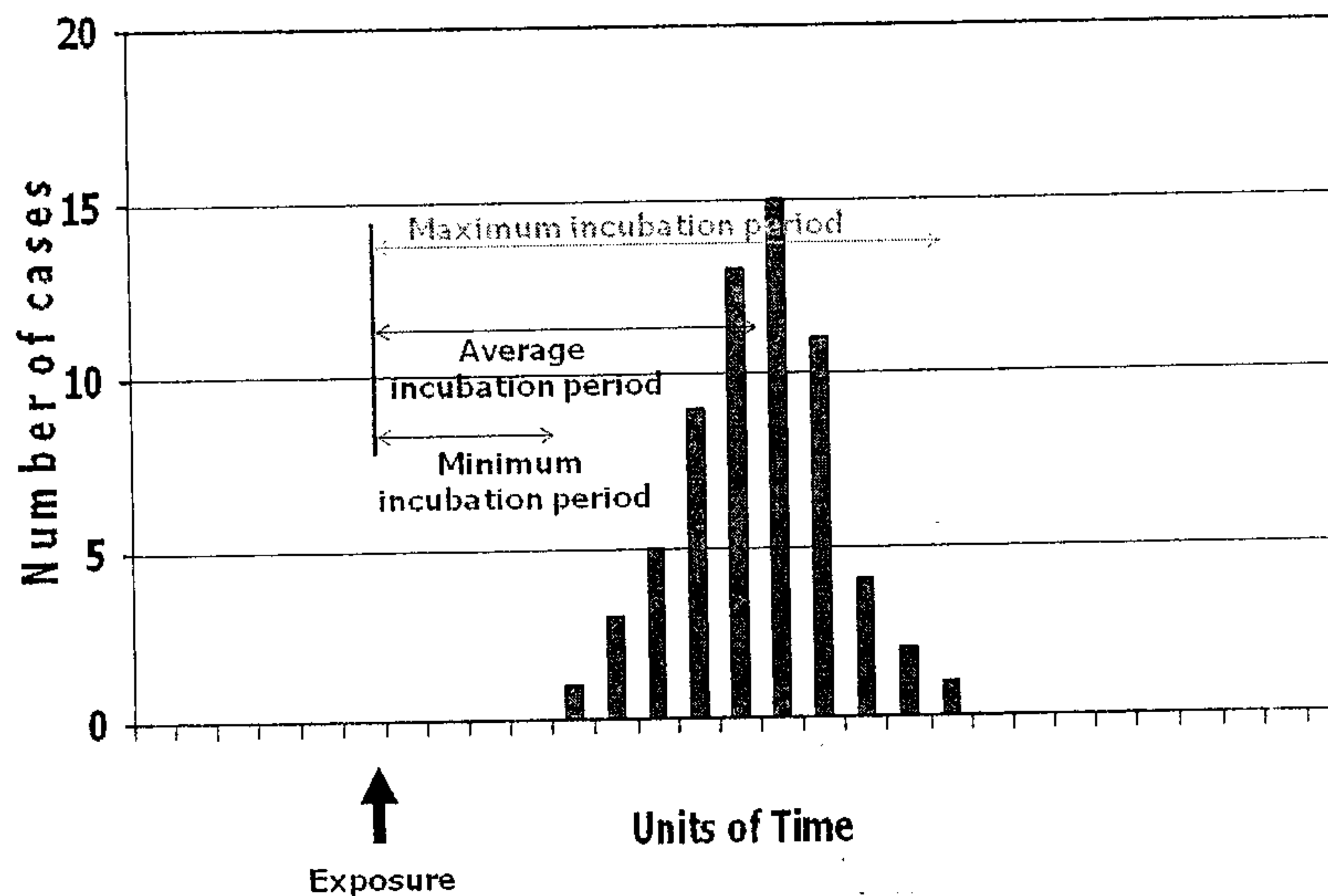
QUESTION 1 MULTIPLE CHOICE [ALL STUDENTS MUST ANSWER THIS QUESTION]

Indicate your response to the items in this question by writing down the letter corresponding to your chosen answer among those provided for each sub-question.

- i. Which one of the following is not a chemical agent of disease?
 - A. Bactericide
 - B. Fungi
 - C. Food additives
 - D. Penicillin
 - E. Insecticide

- ii. When deciding whether or not there is an epidemic, the population assumed to be at risk is usually the population of the
 - A. state from which the cases are reported
 - B. city from which the cases are reported
 - C. geographical area or institution from which the cases are reported
 - D. age-, sex- and place-specific group at highest risk
 - E. All of the above

- iii. The epidemic curve below probably represents cases by a:



- A. common source, exposure not lasting more than one day
 - B. common sources, and a few secondary cases
 - C. propagated source, exposure not lasting more than one day
 - D. common source, exposure lasting a week or longer
 - E. propagated source, exposure lasting a week or longer
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- iv. An epidemic is most often confirmed by:
 - A. a current morbidity of more than 10 cases per week
 - B. a current morbidity rate that is significantly higher than usual
 - C. most laboratory specimen testing positive
 - D. a verified diagnosis

- E. both A and B
- v. An epidemic curve is a graph in which the cases of a disease occurring during an epidemic period are graphed according to their dates of:
- A. exposure
 - B. onset of illness
 - C. diagnosis
 - D. investigation
 - E. death

Questions vi and vii refer to the information below:

The population of a city was 183 000 on March 3, 2003. The number of cases of tuberculosis (TB) diagnosed between January 1 and June 30, 2003 was 26. The number of active TB cases according to the city register on June 30, 2003 was 264.

- vi. The incidence rate of active TB cases in the city for the 6-month period was:
- A. 7 per 100 000 population
 - B. 14 per 100 000 population
 - C. 26 per 100 000 population
 - D. 28 per 100 000 population
 - E. 130 per 100 000 population
- vii. The prevalence rate of active TB as of June 30, 2003 was:
- A. 14 per 100 000 population
 - B. 130 per 100 000 population
 - C. 144 per 100 000 population
 - D. 264 per 100 000 population
 - E. None of the above
- viii. Endemic means that a disease
- A. occurs clearly in excess of normal expectancy
 - B. is habitually present in human populations
 - C. affects a large number of countries simultaneously
 - D. exhibits a seasonal pattern
 - E. is prevalent among animals
- ix. Which one of the following is not a limitation of routine data?
- A. They are often incomplete and inaccurate
 - B. They are prone to bias
 - C. They are often poorly presented or analysed
 - D. Non-standardised definitions are used
 - E. They do not provide baseline data

- x. A survey was conducted among the non-hospitalised adult population of a country during 1988 through 1991. The results from this survey are shown below:

Age group	Persons with hypertension (%)
18 – 29	4
30 – 39	10
40 – 49	22
50 – 59	43
60 – 69	54
70 and older	64

The researchers stated that there was an age-related increase in the risk of hypertension in this population. You conclude that the researchers' interpretation:

- A. is correct
- B. is incorrect because incidence rates do not describe risk
- C. is incorrect because it was not based on rates
- D. is incorrect because prevalence is used
- E. is incorrect because the calculations are not age-adjusted.

[20 marks]

QUESTION 2

An outbreak of cholera is reported in the KwaZulu-Natal Province of South Africa. You are an Environmental Health Officer employed in Lavumisa, a small town in Swaziland adjacent to KwaZulu-Natal. Design control measures you would put in place at Lavumisa to prevent cholera at the primary, secondary and tertiary levels.

[20 marks]

QUESTION 3

- a. During 1966, a total of 126 cases of St. Louis encephalitis (SLE) was reported from a community having a population of 20 000. Calculate the incidence rate of SLE in the community during 1966. (3)
- b. Of the 126 cases of SLE previous referred to, none occurred during the period January through March, 5 occurred during the period April through June, 113 occurred during July through September, and 8 occurred during October through December.
 - i. Calculate the incidence rate per 10 000 population for SLE for each of the quarterly periods. (2)
 - ii. Calculate the proportional distribution of the cases by season. (2)
- c. Further investigation of the 126 cases of SLE revealed that 67 cases were males and the rest females. The number of males in the community is 9 200.
 - i. Calculate the sex-specific incidence rates per 10 000 population. (3)
 - ii. Determine the ratio of male cases to the female rate (2)
 - iii. Calculate the proportional distribution of the cases by sex. (2)

- d. Another item of information obtained from each case during the investigation was the age of the person who had the disease. This information was tabulated by age-group and is presented below. Also given is the total number of people in each age group who live in the community.

Age-group (years)	Number of Cases	Population
0-9	17	3 400
10-19	18	4 200
20-29	9	2 800
30-39	11	2 600
40+	71	7 000
TOTAL	126	20 000

- i. Calculate the age-specific incidence rate per 1 000 population for each of the age-groups shown in the table above. (3)
- ii. Calculate the proportional distribution of the cases by age-group and write your responses in the appropriate column of the table above. (3)

[20 marks]

QUESTION 4

- a. A group of researchers are interested in finding out whether miners are at a higher risk of tuberculosis (TB) than men who do not work as miners. They selected a sample of 2000 men and screened them for TB at the beginning of the study. All those who had signs of coughing or were positive by the tuberculin test were excluded. It was found out that 1000 men worked in the mines and the other 1000 worked elsewhere. The sample is followed-up for ten years and then periodically examined for incidence of TB. Thirty miners were found to have TB at different times of the study period and 60 non-miners were found to have tuberculosis.
- i. What study design is described above? (1)
- ii. List two advantages and two disadvantages of the study design used by the researchers. (4)
- iii. Why were the miners screened at the beginning of the study? (2)
- iv. Use an appropriate epidemiologic measure to determine if there was an association between mining and the risk of tuberculosis. (6)

Randomised control trials are considered the 'gold standard' of epidemiologic research.

- b. Mention one disadvantage of randomised control trials. (1)
- c. With respect to randomised control trials, define the following:
- i. Two forms of bias commonly associated with the information collected. (2)
- ii. Placebo (2)
- iii. Double-blinding (2)

[20 marks]

QUESTION 5

- a. Define the following:
- i. Sensitivity (2)
 - ii. Specificity (2)
 - iii. Positive predictive value; and (2)
 - iv. Negative predictive value (2)
- b. In hypothetical study, 1 000 patients attending a hospital general outpatient department were tested for diabetes using the following tests:
- Fasting Blood Sugar (FBS)
 - Glucose Tolerance Test (GTT)

There were 100 patients who had a positive GTT and were classified as true cases of diabetes. There were 140 patients with FBS of at least 6mmol/l (the cut-off point to distinguish people with diabetes from those who do not have diabetes). Among these 140 patients, only 98 were true cases of diabetes (i.e. only 98 had a positive GTT as well).

Calculate the:

- i. sensitivity (2)
 - ii. specificity (2)
 - iii. positive predictive value, and (2)
 - iv. negative productive value of the FBS test in this study (2)
- c. Selection bias often affects the results of screening programmes. Using examples, explain two ways in which selection bias may affect the results of screening programmes. (4)

[20 marks]

QUESTION 6

- a. Write down the portal of exit of the following diseases of humans. (5)
- i. Influenza
 - ii. Rabies
 - iii. Cholera
 - iv. Syphilis
 - v. Malaria
- b. With regard the portal of entry, what difficulties does it pose for prevention of influenza? (3)
- c. Some diseases are transmissible transplacentally from mother to foetus. Name two such diseases. (2)

- d. Staphylococcal infections are an example of diseases that have a different portal of entry from the portal of exit. What is the portal of entry and the portal of exit for staphylococcal infections? (2)
- e. Discuss the factors that relate to host susceptibility in the infectious disease process. (8)

[20 marks]

QUESTION 7

- a. The table below shows data from a hypothetical unmatched case-control study of smoking and coronary heart disease (CHD).

Exposure	CHD Cases	Controls
Smokers	112	176
Non-smokers	88	224
Total	200	400

- i. What are the advantages of this study design over the cohort design? (4)
- ii. What are the disadvantages of not matching the cases to the controls? (2)
- iii. Name two types of bias that are often associated with case-control studies. (2)
- iv. Use the data and calculate the appropriate epidemiologic measure to determine the association between smoking and CHD. (8)
- b. Define:
- i. passive surveillance; and (2)
- ii. active surveillance (2)

[20 marks]