



UNIVERSITY OF ESWATINI
Faculty of Health Sciences
Department of Environmental Health Science

DEGREE IN ENVIRONMENTAL HEALTH SCIENCE

MAIN EXAMINATION PAPER 2018

TITLE OF PAPER : FUNDAMENTALS OF EPIDEMIOLOGY
COURSE CODE : EHS207
DURATION : 2 HOURS
MARKS : 100

INSTRUCTIONS :

- : READ THE QUESTIONS & INSTRUCTIONS CAREFULLY
- : **QUESTION ONE IS COMPULSORY THEN ANSWER ANY OTHER THREE QUESTIONS**
- : EACH QUESTION **CARRIES 25** MARKS.
- : WRITE NEATLY & CLEARLY
- : NO PAPER SHOULD BE BROUGHT INTO THE EXAMINATION ROOM.
- : BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER.
- : **INDICATE YOUR PROGRAMME OF STUDY**

DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION IS GRANTED BY THE INVIGILATOR.

QUESTION 1

Instruction: Write the letter representing the correct answer of your choice for example; I. B
(Each answer is worth 2 marks)

- I. A propagated epidemic is usually the result of what type of exposure?
 - A. Point source
 - B. Continuous common source
 - C. Intermittent common source
 - D. Person-to-person

- II. An epidemiologist in Manzini receives a phone call from a father in Matsapa who is concerned that several children in his neighbourhood have been diagnosed with Asthma. The father is specifically concerned that a nearby factory is the cause of the asthma. An initial review suggests there are more new cases of asthma in Matsapa than expected. After establishing a case definition of asthma, one of the first things the epidemiologist should do is to:
 - A. conduct a case control study with vicinity to the factory as the exposure of interest
 - B. describe the natural history of asthma in terms of person, place and time
 - C. conduct a prospective cohort study comparing children in Matsapa to children who live elsewhere with asthma as the outcome of interest
 - D. conduct a randomized controlled trial to determine if some medication will help treat the children of asthma

- III. John Snow's investigation of cholera is considered a model for epidemiologic field investigations because it included a:
 - A. Biologically plausible hypothesis
 - B. Comparison of a health outcome among exposed and unexposed groups
 - C. Spot map and recommendation for public health action
 - D. All of the above

- IV. Public health surveillance does not include which of the following activities:
- A. Soliciting case reports of persons with symptoms compatible with SARs from local hospitals
 - B. Creating graphs of the number of dog bites by week and neighbourhood
 - C. Writing a report on trends in seat belt use to share with the state legislature
 - D. Diagnosing whether a case of encephalitis is actually due to West Nile virus infection
- V. A cohort study differs from a case-control study in that:
- A. Subjects are enrolled or categorized on the basis of their exposure status in a cohort study but not in a case-control study
 - B. Subjects are asked about their exposure status in a cohort study but not in a case-control study
 - C. Cohort studies require many years to conduct, but case-control studies do not
 - D. Cohort studies are conducted to investigate chronic diseases, case-control studies are used for infectious diseases
- VI. The following is not a key feature of a cross-sectional study:
- A. It usually provides information on prevalence rather than incidence
 - B. It is limited to health exposures and behaviours rather than health outcomes
 - C. It is more useful for descriptive epidemiology than it is for analytic epidemiology
 - D. It is synonymous with survey
- VII. Which of the following mortality rates use the estimated total mid-year population as its denominator?
- A. Age-specific mortality rate

- B. Sex-specific mortality rate
- C. Crude mortality rate
- D. Cause-specific mortality rate

VIII. What is the following fraction?

Number of deaths due to prostate cancer among men aged 65–74 years in 2004

Estimated number of men aged 65–74 years alive on July 1, 2004

- A. Age-specific mortality rate
- B. Age-adjusted mortality rate
- C. Cause-specific mortality rate
- D. Sex-specific mortality rate

A new screening test has been introduced among a population of 3000 people in Community Y where Disease Z is prevalent among 15% of the population. The screening test could not detect the disease among 63 people who had the disease. On another note, the test detected the disease in 255 people who did not have the disease.

IX. What is the sensitivity of this screening test?

- A. 15%
- B. 90%
- C. 86%
- D. 97%

X. What is the negative predictive value for this screening test?

- A. 15%
- B. 90%
- C. 86%
- D. 97%

XI. Name the type of study that best matches the description as stated below. Example

- A. Butterfly study design (Each correct answer is worth 1 mark)

- A. _____ This study is based upon exposure status.
- B. _____ This study is used with a small, well-defined population.
- C. _____ This study uses the odds ratio to calculate relevant data.
- D. _____ This type of study is also known as a survey.
- E. _____ This study compares groups of people to determine a cause of a disease.

Total=25 marks

QUESTION 2

According to the September bulletin update on epidemics in the world, Dr Zhang Zhongui reported that there has been a rise in the number of African swine fever cases in China. In total, there were 830 susceptible swine resulting to 390 cases, 120 deaths while 750 were vaccinated in the month of September.

- a) Calculate the following outcome measures:
 - i) Mortality rate [1]
 - ii) Morbidity rate [1]
 - iii) Case fatality rate [1]
- b) The Animal department of China has since established a surveillance system for all the animal diseases in the country.
 - i) What is meant by surveillance? [2]
 - ii) What are the objectives of this surveillance system? Mention 5 [10]
- c) Using a diagrammatic illustration of the natural history of a disease, indicate how surveillance assists in identifying opportunities for prevention and control of a disease. [10]

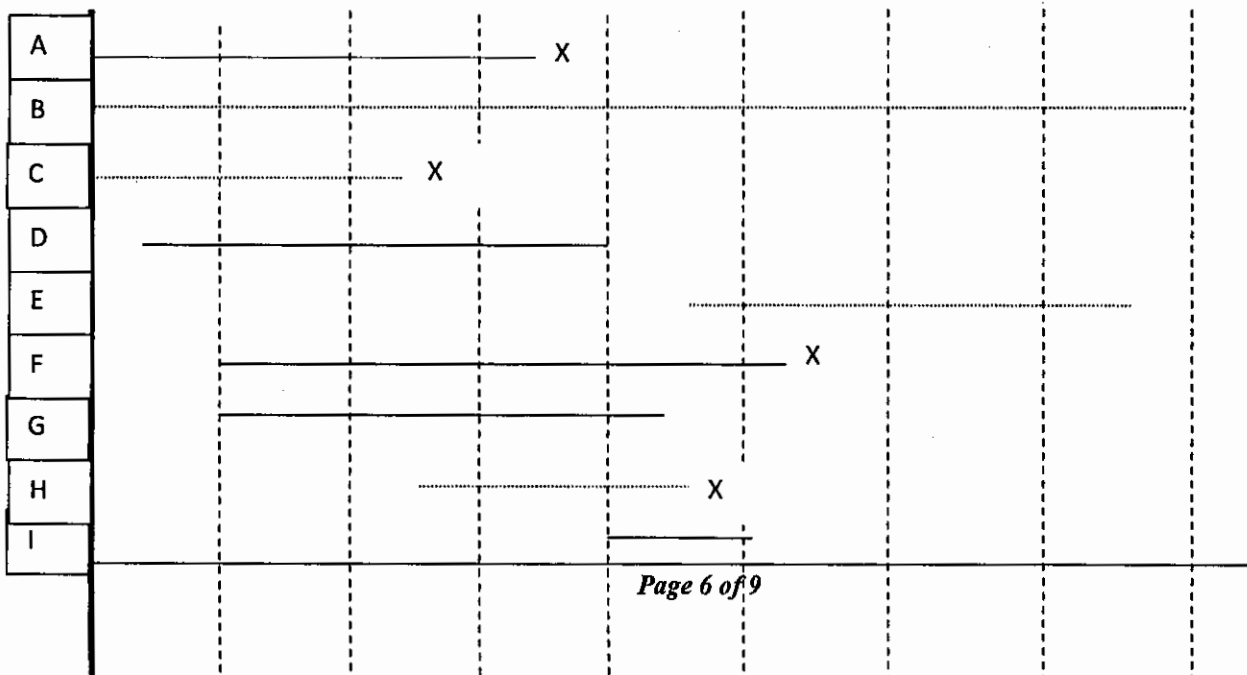
Total=25 marks

QUESTION 3

A study was conducted among group soldiers who retired in 2012 and were followed up for 3 years to study the development of memory loss on army procedures. A total of 1720 retired soldiers were recruited.

Year	New cases	Loss to follow up	Death
1	175	54	8
2	345	72	12
3	473	23	18

- i) What is the cumulative incidence rate in the 3 year study period? [2]
 - ii) Calculate the incidence rate of memory loss among retiring solders in this study using the corrected cumulative incidence rate. [5]
 - iii) Explain the reason for using corrected cumulative incidence in calculating measures of morbidity. [4]
- a) A study was conducted among 11 people who are at risk of developing Disease V. Findings of the study are illustrated in Figure 1 below. **Key: X= subject who acquired Disease V**



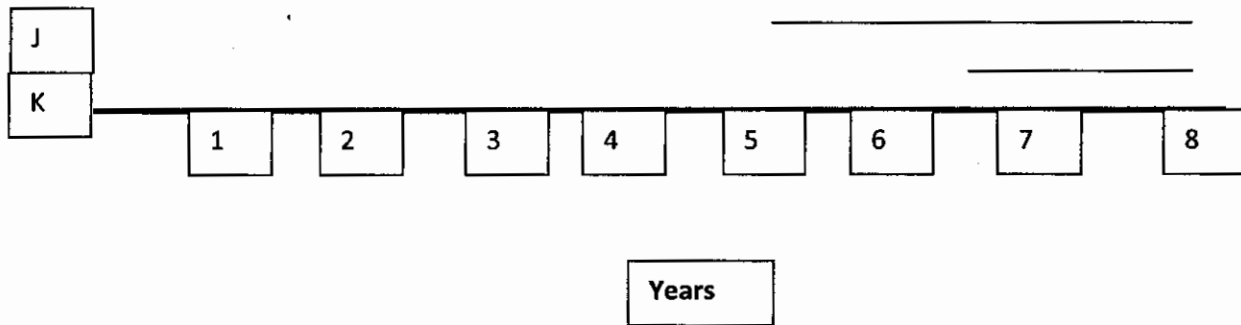


Figure: A study of 11 people susceptible to Disease V

- i) What is the study design illustrated in this diagram? Explain your answer [2]
- ii) Give 2 advantages of this study design. [2]
- iii) How would you explain subject D and E? [3]
- iv) Calculate the total person years in this study. [2]
- v) What is the incidence rate of the disease in the 8 year follow up period using the person years? [2]
- vi) Explain the advantages of using person years in calculating incidence rate in such a study? [3]

Total=25 marks

QUESTION 4

The University of Eswatini's passing rates have dropped in the 5 previous academic years especially among completing students. This has led the management into conducting a study aimed at identifying the causes of the problem. A previous study had revealed that there was a high intake of alcohol by the students thus the institution hypothesized that the poor performance was associated with the high alcohol intake. A total of 1500 students were sampled and asked on their alcohol consumption and their academic record for the 2 previous academic years to assess if there was any change. The institution hired a group of students to be interviewers and these students were trained on interview guidelines. The study revealed that 896 students took alcohol from time to time of which 432 were already

performing badly. Out of those who did not drink alcohol at all, 175 were maintaining a good academic record.

- a) What study design did the university use? Explain your answer. [2]
- b) What are the advantages and disadvantages of this study design? Name 3 for each. [6]
- c) Represent the study findings in a 2x2 contingency table. [4]
- d) Is there any association between alcohol intake and academic performance? Show all your calculations. [4]
- e) The study findings were however challenged by the student body claiming that they were biased. What could be the possible types of bias associated with this study and how could it have been prevented? Discuss 2 biases. [4]
- f) Furthermore, the students claimed the study had so many confounders which were not controlled for as the analysis was done. Name 3 possible confounders for this study. [3]
- g) The students therefore requested that the institution conduct a double blinded randomised control study. Explain this type of study. [2]

Total=25 marks

QUESTION 5

In country C, it has been noted that depression is the leading cause of outpatient hospital visits of late. This has prompted a group of researchers to study the factors predisposing one to depression. Records from the outpatient department (OPD) at the national hospital of country C were used to derive the study population. An inclusion criterion to the study was patients who have visited the hospital more than three times in the past 12 months. A total of 1 360 patients were identified. Patients were interviewed on history of depression in the past 12 months. Out of these patients, 939 reported to have had depression related conditions. However, epidemiologists have challenged this study stating that this study is biased and very erroneous.

- a) Explain 3 possible sources of bias in this study. [6]

- b) From the sources of bias discussed in a), discuss in depth how they could have been avoided with regard to the study giving appropriate examples. [6]
- c) The subjects were stratified by socio economic status (SES) whereby they were categorised into 2 categories; high and low SES. Out of the 1360, 972 were classified as low SES and of these 632 reported to have been depressed in the past 12 months.
- i) Represent the information above in a 2x2 contingency table. [4]
- ii) What type of study design is this study? Explain your answer. [2]
- iii) Is history of depression in past 12 months associated with SES? Show your calculations. [4]
- iv) List three possible confounders in the association above. [3]

Total= 25 marks