

UNIVERSITY OF SWAZILAND
FACULTY OF HEALTH SCIENCES

MAIN EXAMINATION PAPER- DECEMBER 2015

TITLE OF PAPER : FUNDAMENTALS OF EPIDEMIOLOGY

COURSE CODE : EHM203

TIME : 2 HOURS

MARKS : 100

**INSTRUCTIONS : ANSWER QUESTION 1 AND ANY OTHER
THREE QUESTIONS**

: EACH QUESTION CARRIES 25 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**

: SHOW ALL YOUR CALCULATIONS

QUESTION 1

For question 1-10, write the correct letter for each question and a correct answer is worth 2 marks.

1. 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
2. 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 behaviors rather than health outcomes
 - C. It is more useful for descriptive epidemiology than it is for analytic epidemiology
 - D. It is synonymous with survey
3. The epidemiologic triad of disease causation refers to: (Choose one best answer)
 - A. agent, host, environment
 - B. time, place, person
 - C. source, mode of transmission, susceptible host
 - D. John Snow, Robert Koch, Kenneth Rothman
4. A reservoir of an infectious agent can be:
 - A. an asymptomatic human
 - B. a symptomatic human
 - C. the environment
 - D. All of the above
5. Indirect transmission includes all of the following except for:
 - A. droplet spread
 - B. mosquito-borne

- C. foodborne
 - D. doorknobs or toilet seats
6. Disease control measures are generally not directed at which of the following?
- A. Eliminating the reservoir
 - B. Eliminating the vector
 - C. Eliminating the host
 - D. Interrupting mode of transmission

Use the following information for Questions 7–10.

Within 10 days after attending a June wedding, an outbreak of cyclosporiasis occurred among attendees. Of the 83 guests and wedding party members, 79 were interviewed; 54 of the 79 met the case definition. The following two-by-two table (Table 1) shows consumption of wedding cake (that had raspberry filling) and illness status.

Ate Wedding cake	Developed Disease	Dis not Develop disease	Total
Yes	50	3	53
NO	4	22	26
Total	54	25	79

7. The fraction $54/79$ is not:
- A. Food-specific attack rate
 - B. the attack rate
 - C. the incidence proportion
 - D. a proportion
8. The fraction $50/54$ is a/an:
- A. Attack rate
 - B. Food-specific attack rate
 - C. Incidence proportion
 - D. Proportion

9. The attributable proportion for wedding cake is:

- A. 6.1%
- B. 7.7%
- C. 68.4%
- D. 83.7%

10. The best estimate of the association between wedding cake and illness is:

- A. 6.1
- B. 7.7
- C. 15.3
- D. 94.3

11. Identify the appropriate epidemiological term for each letter from the time line in

Figure 1

[5]

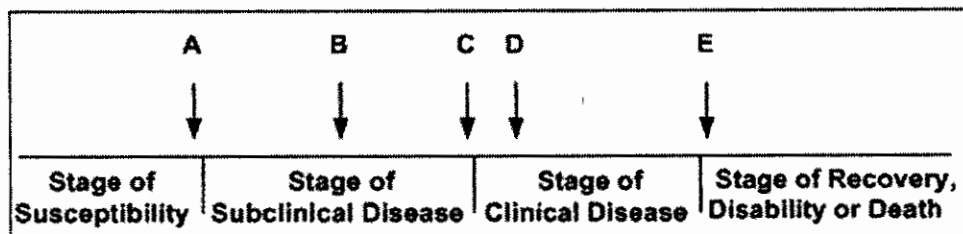


Figure1: Natural history of a disease

[25 marks]

QUESTION 2

A study was conducted by the Malaria control programme whereby 524 pregnant mothers were selected and grouped into two groups. Group A had 300 mothers while Group B had 176. These two groups had different interventions to assess the prevention of malaria. During the pregnancy stage, Group A mothers were given information material on the methods of malaria prevention each time they attended antenatal care(ANC) they were given written material on the subject matter. Group B members were given the given the same material but also the nurses conducting the ANC would from time to time perform health education on malaria prevention to the mothers and also explain the material given in depth. After delivering their babies, the children were followed up for a year for the

infection with malaria. After the one year follow up period, it was discovered that from Group A, 221 children had presented to the clinic with malaria and amongst Group B, only 14 had presented with malaria.

- i) Present the above in a 2x2 table [5]
- ii) What type of study is this? Explain your answer [2]
- iii) Give two advantages and two disadvantages of this study design [4]
- iv) What was the overall prevalence rate of malaria in the study group [2]
- v) Using appropriate epidemiological measures, determine if giving information and explaining it to mothers during pregnancy is beneficial against malaria infection in infants relative to only giving the information and not explaining it in-depth to the mothers during pregnancy. Write your formulas properly and clearly and show all calculations [12]

[25 marks]

QUESTION 3

- a) In community Y with a total population of 100 000 people, a test for disease X was conducted. The test had a sensitivity of 99% and a specificity of 95%. In this community disease X prevalence was 5%.
 - i) Demonstrate the information above in a 2x2 table clearly showing all the calculations involved. [6]
 - ii) Calculate the positive predictive value for disease X at 5% disease prevalence and at 2% disease prevalence [10]
 - iii) What is the relationship between predictive value and disease prevalence and when is a screening programme more productive and efficient? [3]
- b) Discuss the three factors that contribute to the variation between test results [6]

[25 marks]

QUESTION 4

- a) Define the following epidemiological terms
- i) Mortality rate [2]
 - ii) Ratio [2]
 - iii) Attack rate [2]
 - iv) Crude death rate [2]
 - v) Herd immunity [2]
- b) "In 2005, 50,000 women died during pregnancy, childbirth or in the six weeks after delivery"
- i) What is the exact epidemiological term to use for the statement above? [2]

The total population in 2005 was 1 753 421 people with 500 000 female, 375 000 in the reproductive age. A total of 700 000 deaths was reported. Use this information to calculate the following:

- ii) The crude death rate [2]
 - iii) Sex ratio [2]
 - iv) Maternal mortality rate [2]
 - v) Proportional mortality [2]
- c) What is a necessary cause and how is it different from a sufficient cause? Illustrate this using an example of your choice (real or imaginary disease) [5]

[25 marks]

QUESTION 5

- a) What is epidemiology? Discuss the objectives of epidemiology [6]
- b) Mr Smith has been the Chief Executive Director for Factory Z for over 38 years. Last week was his farewell party in the office as he is retiring this week. His personal assistant organized a pizza party for the employees during the morning progress update meeting. Four types of Pizzas were ordered. All the 30 employees in the factory were present but did not eat one type of pizza i.e. they took slices from

different types of pizza. Unfortunately, within 6 hours after consumption of the pizzas 10 employees developed stomach cramps. They were rushed to the nearby clinic and the health worker who attended them suspected that the outbreak was a result of food eaten by the employees. He carried out an investigation to determine the source. The responses were recorded in a 2x2 table (Table 2).

Table2: response from employees from Factory Z after a stomach cramp outbreak

Pizza Type	Stomach Cramp + (10)	Stomach Cramp- (20)
Tomato Pie	5	10
The Original: Neapolitan	4	12
Chicago Deep Dish	7	15
New England Greek	9	5

- i) What type of study is this? Explain your answer [2]
- ii) Calculate the relative risk of stomach cramp associated with each of the types of pizza showing all the calculations clearly [12]
- iii) Which one of the pizza is responsible for the stomach cramps? Explain [3]
- iv) It was then reported that the next morning, one employee was reported to be having stomach cramps. In epidemiology, what is the name given to describe this case and what could be the possible reason for this case? [2]

[25 marks]