UNIVERSITY OF SWAZILAND

FACULTY OF HEALTH SCIENCES

SUPPLEMENTARY EXAMINATION PAPER- JULY 2016

TITLE OF PAPER : FUNDAMENTALS OF EPIDEMIOLOGY

COURSE CODE : EHM 203

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. Many of the students at the boarding school, including 6 just coming down with Disease Y, went home during the mid-term break. About 2 weeks later, 4 siblings of these 6 students (out of a total of 10 siblings) developed Disease Y. The secondary attack rate among siblings was, therefore,:

   a. 4/6
   b. 4/10
   c. 4/16
   d. 6/10

2. Investigators enrolled 100 diabetics without eye disease in a cohort study. The results of the first 3 years were as follows:

   Year 1: 0 cases of eye disease detected out of 92; 8 lost to follow-up

   Year 2: 2 new cases of eye disease detected out of 80; 2 had died; 10 lost to follow-up

   Year 3: 3 new cases of eye disease detected out of 63; 2 more had died; 13 more lost tofollow-up

   The person-time incidence rate is:

   a. 5/100
   b. 5/63
   c. 5/235
   d. 5/250

3. The units for the quantity you calculated in Question 2 could be expressed as:

   a. cases per 100 persons
   b. percent
   c. cases per person-year
   d. cases per person per year

4. In the definition of epidemiology, "distribution" refers to all the below except for:

   a. Who

   b. When

   c. Where

   d. Why

5. In the definition of epidemiology, "determinants" generally includes the following except for:

   a. Agents and causes

   b. Control measures

   c. Risk factors

   d. Sources

6. Epidemiology, as defined in this lesson, would not include which of the following activity?

   a. Describing the demographic characteristics of persons with acute aflatoxin poisoning in District A

   b. Prescribing an antibiotic to treat a patient with community-acquired methicillin-resistant *Staphylococcus aureus* infection

   c. Comparing the family history, amount of exercise, and eating habits of those with and without newly diagnosed diabetes

   d. Recommending that a restaurant be closed after implicating it as the source of a hepatitis A outbreak

7. 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. multivariate statistical model

   d. spot map and recommendation for public health action

8. 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 neighborhood

   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

9. The hallmark feature of an analytic epidemiologic study is: (Choose one best answer)

   a. Use of an appropriate comparison group

   b. Laboratory confirmation of the diagnosis

   c. Publication in a peer-reviewed journal

   d. Statistical analysis using logistic regression

10. A number of passengers on a cruise ship from Puerto Rico to the Panama Canal have recently developed a gastrointestinal illness compatible with norovirus (formerly called Norwalk-like virus). Testing for norovirus is not readily available in any nearby island, and the test takes several days even where available. Assuming you are the epidemiologist called on to board the ship and investigate this possible outbreak, your case definition should include, at a minimum: (Choose one best answer)

    a. Clinical criteria, plus specification of time, place, and person

    b. Clinical features, plus the exposure(s) you most suspect

    c. Suspect cases

    d. The nationally agreed standard case definition for disease reporting

11. Which term best describes the pattern of occurrence of the five instances noted below in a single area? [5]

    A. Endemic

    B. Outbreak

    C. Pandemic

    D. Sporadic

    E. Herd immunity

    a. _____ Disease 1: usually 40–50 cases per week; last week, 48 cases

    b. _____ Disease 2: fewer than 10 cases per year; last week, 1 case

    c. _____ Disease 3: usually no more than 2–4 cases per week; last week, 13 cases

    d. _____Disease 4: 13 million cases in the world

    e. _____Disease 5: population= 1000, 992 vaccinated

[25 marks]

QUESTION 2

a) In community Y with a total population of 100 000 residents, 200 people are infected with disease X in the year 2011. Out of these 200 people, 150 people die due to disease X within that year, 2011.

    i)   What is the prevalence rate of disease X in the year 2011?   [2]

    ii)   What is the case fatality rate due to disease X?   [2]

    iii)   What are five factors that will increase the prevalence rate in this community Y?   [5]

b) In the year 2002, the country, Swaziland had a total population of 2000 000 people. It was revealed that there were 100 000 cases of death within that year. This included 50 000 cases of death per 100 000 people who were sick from cholera.

    i)   What is the cause specific mortality rate?   [2]

    ii)   Calculate the crude death rate in the country.   [2]

c) The incident above was disturbing and health personnel suspected that the country was facing a cholera epidemic outbreak. There was therefore a need for an investigation process to be executed.

    i)   What is meant by an epidemic outbreak?   [2]

    ii)   Outline the steps to be taken in the process of investigation of an epidemic outbreak including all the possible activities to be taken under each step.[10]

[25 marks]

QUESTION 3

a) In 2006,Müller, O., Traoré, C., Kouyaté, B., Yé, Y., Frey, C., Coulibaly, B., et al. conducted a study in rural Burkina Faso with the aim of determining whether the early use of bed nets had an effect on the morbidity rate of malaria among infants. An experimental group of infants used bed nets at birth, and a control group of infants used bed nets at six months of age.

    i)   What type of study design is the above? Explain your answer   [3]

    ii)   Why is this study design referred to as the 'gold' standard of clinical and epidemiological studies?   [2]

iii) Name two advantages and 2 disadvantages of this study design [4]

b) A total of 3387 neonates from 41 villages in rural Burkina Faso were individually randomized to receive either bed net protection from birth (group A= n- 1695) or from age 6 months (group B n- 1692). Primary outcomes were all-cause mortality in all study children and incidence of falciparum malaria in a representative subsample of the study population. These neonates were followed up for 27 months. Findings revealed that among the Group A neonates, only 211 became sick resulting to 16 deaths yet within those who did not fall sick, 113 died. Among Group B, 209 fell sick and 17 of those who fell sick died. On the other hand among the non-sick, 111 died.

i) Present the above information for **morbidity** cases in a 2x2 table [5]

ii) What is the probability of being sick over the 27 month follow up period? [3]

iii) Calculate the relative risk for being infected (sick) [4]

iv) What is the risk difference among the over 5 years [4]

[25 marks]

QUESTION 4

a) Using the rotavirus epidemic in Swaziland as an example, demonstrate the infectious disease process. [6]

b) Health reports from the Ministry of Health in the country have revealed that every year between the months May and August, there is an outbreak of rotavirus. This is the leading cause of death among the under-fives in the country. In 2012, there were 547(May- 104, June- 230, July- 198 and August=15), 674 (May- 217, June- 433, July- 21 and August=3) in the year 2013 and a total of 342(May- 115, June- 200, July- 26 and August=1) in the year 2014 cases reported. It was also revealed that in the year 2015 there was a decrease in the incidence of the disease.

i) Illustrate the above in an epidemic curve [5]

ii) What type of outbreak is the above? [2]

iii) What could have contributed to the decrease in the incidence rate of the virus? (Hint: use the three modes prevention) [6]

c) Discuss the three dimensions of research design   [6]

[25 marks]

QUESTION 5

a) In conducting epidemiological studies, researchers have a duty to ensure true representativeness of their findings. However from time to time their findings are distorted by bias and confounders.

    i)   What is meant by bias in epidemiology?   [1]

    ii)   Discuss the two types of information bias.   [2]

    iii)   What is meant by confounding and what are the four conditions necessary for confounding?   [5]

b) A group of 500 women diagnosed with cancerous breast lump were followed up for a period of 3 years for the development of full blown breast cancer. At the end of the first year, 43 developed full blown breast cancer and 21 had died. In the second year, 75 developed full blown breast cancer and none died. At the end of the third year 103 women had developed full blown breast cancer and 23 were loss to follow up.

    i)   What type of study is illustrated above   [2]

    ii)   Name two advantages and two limitations of this study design   [4]

    iii)   Illustrate the above in a table.   [5]

    iv)   Calculate the cumulative incidence rate of breast cancer in the three year follow up period   [2]

    v)   Calculate the person years of these women within the three year follow up period.   [4]

[25 marks]