UNIVERSITY OF ESWATINI

FACULTY OF HEALTH SCIENCES

DEPARTMENT OF COMMUNITY HEALTH NURSING SCIENCE

MAIN EXAMINATION

NOVEMBER, 2021

COURSE TITLE: COMMUNITY HEALTH NURSING SCIENCE IV (EPIDEMIOLOGY)

COURSE CODE: NUR 521

TIME ALLOWED: 2 HOURS

MARKS: 75

No of pages including cover page: **8**

INSTRUCTIONS:

1. THERE ARE TWO SECTIONS IN THIS PAPER.

2. SECTION ONE (1) COMPRISES OF MULTIPLE CHOICE AND TRUE/FASLE QUESTIONS.

3. SECTION TWO (2) COMPRISES OF CALCULATIONS AND SHORT ESSAY QUESTIONS.

4. ANSWER ALL QUESTIONS

DO NOT OPEN THIS PAPER UNTIL YOU ARE TOLD TO DO SO

SECTION A: MULTIPLE CHOICE QUESTIONS

Instruction:*For each of the following questions, write down the letter that indicates the best answer out of the given options.*

1. Epidemiology is considered as the basic science of public health; therefore, the primary goal of public health is to:
    A. Protect the infected
    B. Protect the uninfected
    C. Protect the identity of those who have died from an infectious disease
    D. B and C.

2. One of the fundamental premises underlying the study of epidemiology is…
    A. Disease, illness and ill health are randomly distributed in a population.
    B. Disease, illness and ill health are not randomly distributed in a population.
    C. Disease, illness and ill health are only randomly distributed in large populations.
    D. Disease, illness and ill health are very rarely distributed in large populations.

3. The attack rate in susceptible people who have been exposed to a primary case is referred to as…………………………………………
    A. The attack rate
    B. The post primary attack rate
    C. The secondary attack rate
    D. The person-to-person attack rate

4. A researcher is interested in knowing the number of new measles cases that developed at Montessori's Elementary School in April 2015. Assuming that no children enrolled during that month, and no children moved during that month (all children were followed for the entire month), which measure of morbidity would be most appropriate in answering the researcher's question?
    A. Prevalence
    B. Point prevalence
    C. Cumulative Incidence
    D. Incidence Density

5. Which of the following factors is most important when considering the validity of the results of a clinical trial?
    A. There are equal numbers of people in the intervention and control groups
    B. A relatively high incidence of the outcome of interest in the study population
    C. Inclusion of people of all ages
    D. Random allocation of participants to the intervention and control groups

6. A nursing sister working at Siteki Referral Hospital tells you that in collaboration with laboratory technicians, a new serological test has been developed for diagnosis of the delta variant of corona virus. The nursing sister then tell you that the test has since been used on 200 health care professionalsknown to be infected with COVID-19 based on isolation of the delta variant from throat swab samples, and 300 health care professionals designated free of COVID-19. Among the 200 health care professionals known to be infected with COVID-19, 120 had a positive test and 80 had a negative test. Among the 300 health care professionals designated free of COVID-19, 30 had a positive test and 270 had a negative test. The nursing sister is requesting you to help her determine the sensitivity of the serological test. You tell her that the sensitivity of the serological test for detecting the delta variant of corona virus is ....
   A. 90%
   B. 80%
   C. 60%
   D. 40%

For each of the fractions shown below, indicate whether it is a ratio, a proportion, a rate, or none of the three.

   A. Ratio
   B. Proportion
   C. Rate
   D. None of the three above

7. # of women in Eswatini who dies from COVID-19 complications in 2020
   # of women in Eswatini who died in 2020

8. # of men in Eswatini who died from coronavirus infection in 2020
   Estimated # of men living in Eswatini on 1st July, 2020

9. #of women in Eswatini who died from mental diseases in 2019
   # of women in Eswatini who died from breast cancer in 2019

10. #of women in Eswatini who died from cervical cancer in 2020
    # of women in Eswatini who died from all types of cancer in 2020

11. #of men in Eswatini who died from lung cancer in 2020
    Estimated revenue (in SZL) in Eswatini from cigarette sales in 2020

For each of the fractions shown below, indicate whether it is an incidence proportion, incidence rate, prevalence, or none of the three.

A. Incidence proportion
B. Incidence rate
C. Prevalence
D. None of the three above

12. $\dfrac{\text{\# of women in a Framingham Study who have died through last year from heart disease}}{\text{\# of women initially enrolled in Framingham Study}}$

13. $\dfrac{\text{\# of women in a Framingham Study who have died through last year from heart disease}}{\text{\# of person-years contributed through last year by women initially enrolled in Framingham Study}}$

14. $\dfrac{\text{\# of women in town of Framingham who have reported having heart disease in recent health survey}}{\text{Estimated \# of women residents of Framingham during the same period}}$

15. $\dfrac{\text{\# of women in Framingham Study newly diagnosed with heart disease last year}}{\text{\# of women initially in Framingham Study without heart disease at the beginning of same year}}$

16. $\dfrac{\text{\# of UNESWA students newly diagnosed with mental disease in 2020}}{\text{Estimated \# of students enrolled at UNESWA on 1}^{\text{st}}\text{ July, 2020}}$

17. $\dfrac{\text{Estimated \# of female students who fell pregnant at FHS in 2020}}{\text{Estimated \# of female students enrolled at FHS on 1}^{\text{st}}\text{ July, 2020}}$

18. $\dfrac{\text{\# of women in Eswatini who reported heart disease in 2018 health survey}}{\text{Estimated \# of women smokers in Eswatini according to 2018 Behavioural Risk Factor Survey}}$

Use the following choices for Questions 19-21.
A. Cluster
B. Epidemic
C. Outbreak

19. 200 cases of the lambda variant of corona virus infection in several states of United States of America over several months

20. 40 cases of Salmonella Enteritis in 1 week traced to a single meal served at a in a colleague's wedding ceremony

21. 10 cases of cancer diagnosed over 2 years among residents of a single neighbourhood

For each of the following risk factors and health outcomes, identify whether they are:
   A. necessary causes
   B. sufficient causes
   C. component causes

Risk Factor	Health Outcome
22. Hypertension	stroke
23. Treponema pallidum	syphilis
24. Type A personality	Heart disease
25. Skin contact with a strong acid	burn

[Total marks = 25]

SECTION B: SHORT ESSAY QUESTIONS AND CALCULATIONS

Question 1

The Figure below represents 10 new cases of illness over about 15 months in a population of 20 persons in Nilathu Region. Each horizontal line represents one person. The down arrow indicates the date of onset of illness. The solid line represents the duration of illness. The up arrow and the cross represent the date of recovery and date of death, respectively.
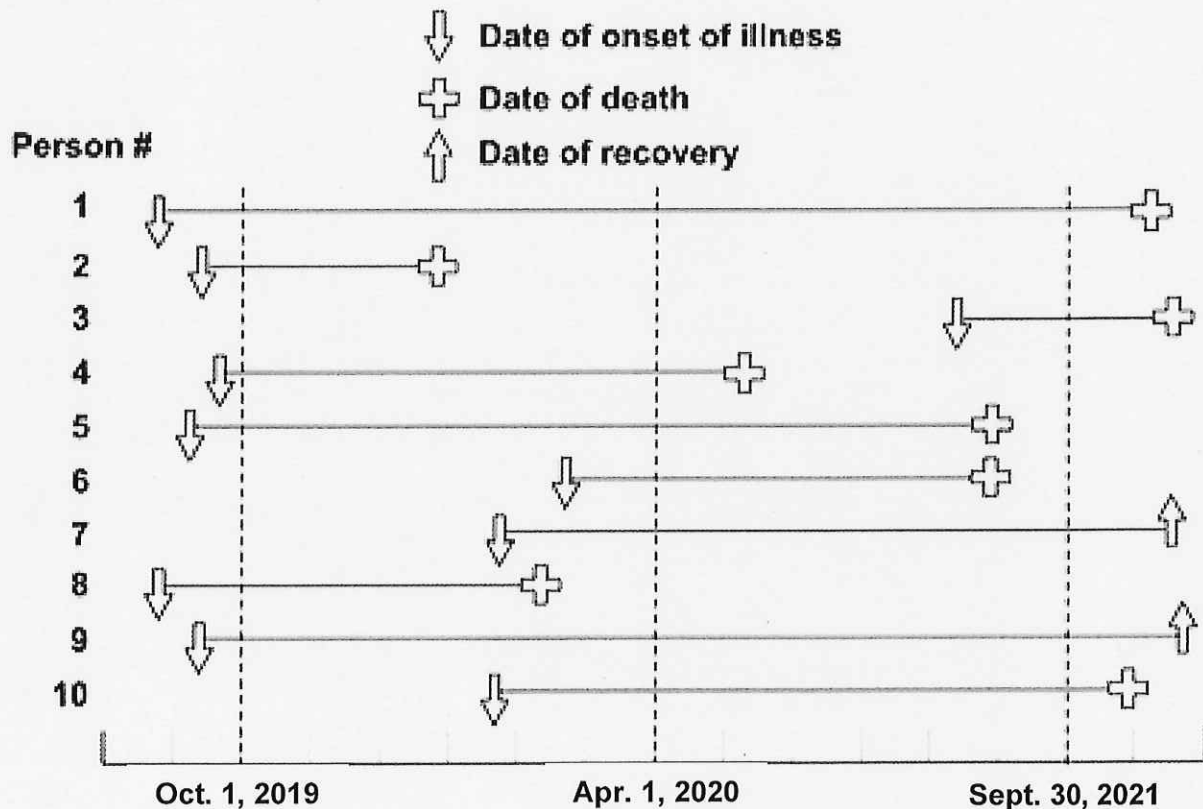

Figure 1: New Cases of COVID-19 illness from 1 October, 2019 to 30 September, 2021 in Nilathu Region.

A. Study the figure above and describe the information shown   (3)

B. Calculate the incidence rate of COVID-19 infection from October 1, 2019, to September 30, 2021, using the midpoint population (population alive on April 1, 2005) as the denominator. Express the rate per 100 population.   (3)

C. Calculate the point prevalence on 1ˢᵗ April, 2020.   (3)

D. Calculate the period prevalence from 1stOctober, 2019 to 30thSeptember, 2021.
(3)

E. The diabetes follow-up study included 218 diabetic women and 3,823 nondiabetic women. By the end of the study, 72 of the diabetic women and 511 of the nondiabetic women had died. The diabetic women were observed for a total of 1,862 person years; the nondiabetic women were observed for a total of 36,653 person years. Calculate the incidence rates of death for the diabetic and non-diabetic women. (4)

F. Du *et al.*, (2021) enrolled 2,100 university students in a study and followed them annually for four years to determine the incidence depression. After one year, none had a new diagnosis of depression, but 100 had been lost to follow-up. After two years, one had a new diagnosis of depression, and another 99 had been lost to follow-up. After three years, another seven had new diagnoses of depression, and 793 had been lost to follow-up. After four years, another 8 had new diagnoses with depression and 392 more had been lost to follow-up.Calculate the incidence rate of depression among this cohort. Assume that persons with new diagnoses of depression and those lost to follow-up were disease-free for half the year, and thus contribute ½ year to the denominator. (9)

[Total marks = 25]

Question 2
A. Read the following adapted abstract of a published paper.
Hurley et al. Tobacco smoking and alcohol consumption as risk factors for glioma: a case-control study in Melbourne, Australia. J Epidemiol Community Health 1996; 50: 442-6.

OBJECTIVE: To investigate possible associations between tobacco smoking and alcohol consumption and the risk of adult glioma. DESIGN: This was a population based, case-control study. Relative risks (RR) were estimated using logistic regression analysis. SETTING: Melbourne, Australia. PARTICIPANTS: These comprised 416 case subjects (166 women, 250 men), 66% of those eligible; and 422 control subjects (170 women, 252 men), 43.5% of those potentially eligible. RESULTS: There was no increase in risk of glioma with having ever smoked tobacco (RR 1.29, 95% CI 0.95, 1.75) for all subjects, adjusted for age, a reference date, and gender. There was a slight increase in risk for men (RR 1.64, 95% CI 1.1, 2.45), but not for women (RR 0.99, 95% CI 0.62, 1.62). For men, there was no increase in risk with increasing pack-years of cigarette smoking, but the risk was significantly increased in subjects who had smoked for less than 10 years. There was no increase in risk associated with having ever drunk alcohol for all subjects (RR 0.96, 95% CI 0.67, 1.37), women (RR 0.69, 95% CI 0.4, 1.15) or men (RR 1.40, 95% CI 0.81, 2.43). CONCLUSIONS: This study does not support an association between either tobacco smoking or alcohol consumption and glioma. The pattern of risk associated with tobacco smoking in men appears inconsistent with a causal role, and may be due to chance, response bias, or uncontrolled confounding.

i. Glioma is the most common type of primary brain tumour in adults. Glioma tends to kill people or leave them mentally incapacitated. Where cases had died or were unable to complete questionnaires, information was obtained from a relative or friend. Explain how this might contribute to information bias. What impact would this be likely to have on the relative risks? (3)

ii. Controls were persons living in the same suburb as the case, identified through the electoral roll. Only 44% of potential controls participated in the study. Explain how this could create bias. (2)

iii. In this study, 10 of the cases and 6 of the controls had a history of meningitis. Create a 2x2 table and calculate the odds ratio for the association between history of Meningitis and glioma. (5)

B. A study from the University of Texas examined whether the risk of Hepatitis C (Hep C) was related to whether people had tattoos. A sample of 600 individuals was randomly selected from the student population. In this sample 113 had a tattoo. For individuals with a tattoo, 22 were found to have Hepatitis C and for individuals without a tattoo, 25 were found to have Hepatitis C. Researchers want to know if there is evidence from this study of an increased prevalence of Hep C for individuals with a tattoo amongst the population from which they were sampled.

i. What study design is being used in this example? (1)

ii. State the formal statements of the Null and Alternative hypotheses. (2)

iii. Construct an appropriately labelled 2x2 table to display these data. (7)

iv. Calculate the sample prevalence (risk) ratio for Hep C among individuals with a tattoo compared to individuals without a tattoo. Interpret it. (5)

[Total marks = 25]