

**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE
AND TECHNOLOGY**

2013/2014 UNIVERSITY EXAMINATIONS

**FIRST YEAR FIRST SEMESTER EXAMINATIONS FOR THE
DEGREE OF MASTER OF PUBLIC HEALTH**

KISII LEARNING CENTRE

COURSE CODE: HMP 5112

TITLE: PRINCIPLES OF EPIDEMIOLOGY

DATE: AUGUST 2013

TIME: 8.00 – 12.00 NOON

DURATION: 3 HOURS

INSTRUCTIONS

1. Write your University Registration Number on every booklet that you use
2. Do not write your name on any paper you use.
3. This paper consists of **THREE SECTIONS**
4. Read carefully the additional instructions preceding each section

SECTION A: MULTIPLE CHOICE QUESTIONS (25 marks)

For this section, Only ONE response is correct. Circle the correct response.

1. The following are true about cohort studies EXCEPT:
 - A. Efficient for rare exposures
 - B. Prone to loss to follow up
 - C. Is the strongest experimental design for establishing cause-effect relationship
 - D. Also called incidence study

2. The proportion of individuals who test positive with a screening test who actually have the disease is called?
 - A. Sensitivity
 - B. Specificity
 - C. Predictive value positive
 - D. Predictive value negative

3. How would you classify an epidemic with a curve that rises rapidly, peaks and then decreases gradually?
 - A. Point source
 - B. Propagated
 - C. Continuous source
 - D. Intermittent source

4. The following are true about Cumulative incidence EXCEPT:
 - A. Is a proportion
 - B. Is a measure of individual risk
 - C. Requires a dynamic population
 - D. Requires a closed population

5. The natural course of a communicable disease involves a susceptible host, a point of exposure, a subclinical disease phase, a clinical phase, and a phase of recovery, disability or death. Which phase is related to the latency period?
 - A. Susceptibility phase
 - B. Subclinical phase
 - C. Clinical disease phase
 - D. Recovery, disability or death phase

6. What is an appropriate measure of association in a cohort study involving incidence proportion?
 - A. Rate ratio
 - B. Odds ratio
 - C. Risk ratio
 - D. Cumulative incidence

7. Which of the following terms refers to a persistent, expected level of disease in a defined population?
 - A. Epidemic
 - B. Outbreak
 - C. Endemic
 - D. Pandemic

8. Which of the following statements does not correctly represent a feature of the case-control study design:
 - A. One selects controls without the disease
 - B. It is relatively inexpensive
 - C. Is effective in computing the incidence rates
 - D. Results are best presented as odds ratio

9. Select the correct statement:
 - A. The attributable risk is a ratio of the disease risk in the exposed compared to the non-exposed during a defined period of time
 - B. Risk difference is the excess risk of disease in the exposed compared to the non-exposed during a defined period of time
 - C. Point incidence is the disease risk in a defined group at a specific point in time
 - D. The attributable risk is the prevalence of disease in the exposed minus the prevalence of disease in the non-exposed

10. Pathogenicity is:
 - A. The ability of a disease agent to produce toxins or poison
 - B. The ability of a disease agent to produce clinically apparent illness in an infected host
 - C. The ability of a disease agent to induce antibody production in the host
 - D. The ability of a disease agent to invade and multiply in a susceptible host
 - E. The ability of a disease agent to produce severe clinical manifestation of disease in a host

11. The following may result from a high frequency of false positive test results in a screening programme EXCEPT:
 - A. Overuse of health facilities due to increased referrals
 - B. Delayed medical attention
 - C. Anxiety and fear of having a serious disease
 - D. Inconvenience due to additional time and expense for follow up tests

12. Which study design is appropriate for determining the incidence of disease?
 - A. Ecological study
 - B. Cross-sectional study
 - C. Case-control study
 - D. Cohort study

13. Which of the following best describes a secular trend?
- Long-term changes
 - Seasonal changes
 - Cyclical changes
 - Short-term fluctuations
14. Which one of the following best defines the specificity of a diagnostic test?
- Proportion of people with a negative test but who have the disease
 - Proportion of people without the disease who have a positive test
 - Proportion of people without the disease who have a negative test
 - Proportion of people with a positive test who have the disease
15. The following is an example of a live attenuated vaccine:
- BCG
 - Tetanus toxoid
 - Pertussis
 - Hepatitis B
16. The fraction shown below is a :
- Proportion
 - Rate
 - Ratio
 - Cumulative incidence
- $$\left(\frac{\text{\# men who died of AIDS in Kisumu in 2012}}{\text{\# men who died in Kisumu in 2012}} \right) \times 100$$
17. The following are measures of association EXCEPT:
- Prevalence proportion
 - Odds ratio
 - Risk difference
 - Rate ratio
18. Which of the following designs is best suited if the exposure is extremely rare?
- Cross-sectional
 - Prospective cohort
 - Retrospective cohort
 - Case-control
19. Period prevalence is defined as:
- The number of existing cases of a disease at a point in time
 - Useful for evaluating the effect of exposure
 - The proportion of existing cases of a disease during an interval of time
 - The number of new cases of a disease over a period of time

20. Which level of prevention is appropriate for reducing the consequences of a disease by early detection and treatment?
- A. Primary
 - B. Secondary
 - C. Tertiary
 - D. Primordial prevention
21. The following are measures of excess disease risk due to exposure EXCEPT:
- A. Attributable risk
 - B. Risk difference
 - C. Relative risk
 - D. Absolute risk
22. Who of the following described the association between cholera and drinking water in London?
- A. Edward Jenner
 - B. William Farr
 - C. John Graunt
 - D. John Snow
23. The result of a case-control study should be reported as?
- A. Prevalence ratio
 - B. Odds ratio
 - C. Rate ratio
 - D. Risk ratio
24. A recent train derailment exposed residents of a community to a chemical hazard. Many residents became ill and some died. To calculate the risk of illness, which denominator would you use?
- A. The size of the population at risk at the beginning of the period
 - B. The size of the population at risk at the midpoint of the period
 - C. The size of the population at risk at the end of the period
 - D. The mid-year size of the population at risk during the period
25. Which of the following measures of disease occurrence can be computed from a fixed cohort?
- A. Cumulative incidence
 - B. Incidence rate
 - C. Odds ratio
 - D. Risk ratio

SECTION B: SHORT ANSWER QUESTIONS (20 marks)

USE a separate sheet of paper. ANSWER ALL QUESTIONS IN THIS SECTION

1. Define the following terms:
 - (a) Incubation period [1 mark]
 - (b) Screening [1 mark]
 - (c) Sporadic [1 mark]
2. In ONE sentence, specify the key features of the following study designs:
 - (a) Clinical trial [2 marks]
 - (b) Case-control study [2 marks]
 - (c) Cohort study [2 marks]
 - (d) Cross sectional study [2 marks]
 - (d) Ecological study [2 marks]
3. List 3 differences between :
 - (a) An experimental study and a cohort study [6 marks]
 - (b) Cumulative incidence and incidence rate [6 marks]

SECTION C: COMPULSORY QUESTION (30 marks)

USE a separate sheet of paper.

1. A case-control study of the association between coffee drinking and pancreatic cancer gave the following results:

	Non-coffee users (unexposed)	Coffee drinkers (exposed) No. of cups drunk/day		
		1-2	3-4	>5
Cases	20	153	106	93
Controls	88	271	154	130

- (a) Calculate the odds ratio of pancreatic cancer , with non-coffee users as the reference group, for those drinking:
 - (i) 1-2 cups of coffee per day [3 marks]
 - (ii) 3-4 cups of coffee per day [3 marks]

- (iii) more than 5 cups of coffee per day [3 marks]
- (b) Set up a 2X2 table and re-calculate the odds ratio of coffee drinking on pancreatic cancer without considering the number of coffee cups drank per day [6 marks]
- (c) State the meaning of your answer in (c) in your own words. [2 marks]
- (d) Discuss the role of controls in a case control study [2 marks]
- (e) List 3 advantages and 3 limitations of a case-control study [6 marks]
- (f) List FIVE differences between a case control study design and a retrospective cohort design? [5 marks]

SECTION D: OPTIONAL SHORT ANSWER QUESTIONS (20 marks)

QUESTIONS 2 through 4 are OPTIONAL.

USE a separate sheet of paper.

Choose any TWO Questions from Questions 2 to 4 (10 marks each)

2. An epidemiological study was conducted among men in Kenya to find out whether the use of hormones by their mothers during pregnancy influenced the son's risk of developing prostate cancer later in life. The investigators selected 500 men who were hospitalized for prostate cancer (cases) and 1000 control men. The study found that 90 mothers of the cases and 50 mothers of the controls had used hormones during pregnancy.
 - (a) What study design was used in this study? [2 mark]
 - (b) Set up the 2X2 table for this data [2 marks]
 - (c) Calculate the odds ratio [2 marks].
 - (d) In your own words, what does the result in (c) mean? [2 marks]
 - (e) Explain why a case-control study design is sometimes considered an inferior study design compared to a cohort study [2 marks]

3. A study was conducted among patients visiting at Kericho District Hospital for evaluation of possible Tuberculosis. They were all screened by a sputum smear for TB. Out of 595 patients who had chronic (over 2 weeks) cough, 75 tested positive for TB, compared with 16 out of 712 patients who had coughed for less than 2 weeks.
 - (a) Construct a 2X2 table for this data [2 marks].
 - (b) Calculate the:
 - (i) prevalence of TB [1 mark]
 - (ii) sensitivity of a sputum smear [1 mark];
 - (iii) specificity of a sputum smear [1mark];
 - (iv) positive predictive value of a sputum smear [1 marks], and

- (v) negative predictive value for a sputum smear [1 marks].
- (c) List any 3 consequences of a false negative screening result [3 marks]
4. Between 1951 and 1971, a total of 10,000 deaths were recorded among 34,440 male British doctors (Doll and Peto, 1976). Of these deaths, 441 were from lung cancer and 3191 were from ischaemic heart disease. Doctors who smoked at least one cigarette per day during this follow-up period were classified as smokers and the rest as non-smokers. The age-adjusted annual death rates per 100,000 male doctors for lung cancer and ischaemic heart disease among smokers and non-smokers are given in the table below:

Cause of death	Annual death rate per 100,000 doctors	
	Non-smokers	Smokers
Lung cancer	10	140
Ischaemic heart disease	413	669

- (a) Calculate the rate ratio to assess the strength of association between smoking and:
- lung cancer [1 mark]
 - ischaemic heart disease [1 mark]
- (b) Which disease is strongly associated with smoking? [1 mark]
- (c) Calculate the attributable risk percent of smoking for
- lung cancer [2 marks]
 - ischaemic heart disease [2 marks]
- (d) If there was a reduction in smoking, on which of these two diseases would it have a greater public health impact on reducing mortality? Explain. [3 marks]