



UNIVERSITY EXAMINATIONS 2014/2015 ACADEMIC YEAR

**3rd YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF
SCIENCE NURSING AND PUBLIC HEALTH**

**COURSE CODE/TITLE: HNS 303: BIostatISTICS AND
EPIDEMIOLOGY**

END OF SEMESTER: II

DURATION: 3 HOURS

DAY/TIME: MONDAY: 8.00 - 11.00 AM

DATE: 8/12/2014 (PL9)

INSTRUCTIONS: ANSWER ALL QUESTIONS

SECTION A (1 mark for each question)

1.If a disease simultaneously affects persons of several countries or continents and effects them in numbers in clear excess of normalcy, the disease is said to be:

- A. endemic
- B. epidemic
- C. pandemic
- D. zoonotic

2.The period between exposure and first symptom is the:

- A. stage of susceptibility
- B. subclinical stage of disease
- C. stage of clinical disease
- D. stage of disability

3.A particular infectious disease can display a broad scope of manifestations and severities. This is known as the:

- A. incubation period
- B. gradient of infection
- C. endemic level of disease
- D. stage of susceptibility

4. The “epidemiologic triad” includes all of the following *except*:

- A. agent
- B. host
- C. environment
- D. behavioral factors

5. Modes of horizontal transmission of disease, except

- A. Contact
- B. Vector
- C. Common Vehicle
- D. Genetic

6. A new treatment is developed that prevents death but does not produce recovery from disease. Which of the following will occur?

- A. Prevalence will increase
- B. Prevalence will decrease
- C. Incidence will increase
- D. Incidence will decrease

7: What is the leading cause of adult mortality worldwide?

- A. Malaria
- B. Heart diseases
- C. Road Traffic Accidents
- D. HIV/AIDS

8. Which of the following DOES NOT explain why there is a rural/urban disparity in fertility in Kenya

- A. Education levels
- B. Marital status
- C. Availability of jobs
- D. Family planning resources

9. Which of the following mortality measures DOES NOT have 'number of live births in the same year' as the denominator

- A. Infant mortality rate
- B Neonatal mortality
- C. Maternal mortality
- D. All above have live births in denominator

10. What is projected to be the leading cause of death among adults worldwide by 2020?

- A. Injuries
- B. Cancers
- C. HIV/AIDS
- D. None of the above

11. Which of the following is an example of nominal variable :

- A-age of visitors of a clinic.
- B-The time to finish the exam.
- C-Whether or not a person is infected by influenza.
- D-Weight for a sample of girls .

12. The probability of committing a Type I error is called _____.

- A. α
- B. β
- C. χ
- D. σ

13. In testing hypotheses, the researcher initially assumes that the _____.

- A. alternative hypothesis is true.
- B. null hypothesis is true
- C. errors cannot be made
- D. the population parameter of interest is known

14. Consider the following null and alternative hypotheses. $H_0 : \mu \geq 78$ $H_a : \mu < 81$

These hypotheses _____.

- A. are not mutually exclusive
- B. are not collectively exhaustive
- C. do not reference a population parameter
- D. are established correctly

15. A national achievement test is administered to nurses annually. The test has a mean score of 100 and a standard deviation of 15. If Jane's z-score is 1.20, what was her score on the test?

- A) 82 B) 118 C) 100 D) 112

16. A variable is a

- A. subset of the population.
- B. parameter of the population.
- C. relative frequency.
- D. characteristic of the population to be measured.

17. If you achieved a p-value of 0.04 on a two-tailed test, what would the equivalent one-tailed p-value be?

- A 0.2 B 0.02 C 0.002 D. 0.06

18. Of the below non-parametric tests, which relies on the calculation of ranks

- A. Spearman's Rho B. Mann Whitney C. Wilcoxon D. All of the above.

19. Under what circumstances would you use a non-parametric test?

- A. When you do not really understand a parametric test
- B. When the sample size is too big
- C. In a pilot study
- D. When your data does not meet the assumptions for a parametric test

20. The stem plot below shows the number of patients who reported for X-ray due to road accidents followed for some days.

80	1
70	
60	4 7
50	2 2 6
40	0 2 5 7 9 9
30	5 7 9
20	7 9
10	1

Which of the following statements is true

- I. The range is 70
- II. The median is 46

A) I only B) II only C) I and II D) Neither is true.

SECTION B

QUESTION ONE [10 MARKS]

With reference to population pyramids,

- (a) Use rough diagrams to illustrate the three types of pyramids and provide an example of a country in which you expect to see each population pyramid... [6 MARKS]
- (b) Choose any two and discuss what the shapes say about Mortality and life expectancy [4 MARKS]

QUESTION TWO [10 MARKS]

Kenya uses the Demographic and Health survey to gather statistics on health in the nation. The last survey was conducted in 2008-9 and reported in 2010. From this data, under five mortality stands at 74 deaths per 1,000 live births.

- (a) Define under 5 mortality? [2 MARKS]
- (b) What are the top 5 leading causes of death for children under 5? [5 marks]
- (c) Which age group contributes the most to these under 5 deaths and which two strategies can reduce deaths in this age group? [3 MARKS]

QUESTION THREE [10 MARKS]

A random sample of eight clinical officers insured with a company and having similar insurance policies was selected. The following table lists their working experiences in years and monthly insurance premiums.

Working experiences(years) x	Monthly insurance Premium(\$) y
5	64
2	87
12	50
9	71
15	44
6	56
25	42
16	60

- a) Find the least squares regression line [3 marks]
- b) Calculate r and r^2 and explain what they mean [2 marks]
- c) Predict the monthly insurance premium for an officer with 10 years of experience [1 mark]
- d) Compute the standard deviation of errors [2 marks]
- e) Construct a 90% confidence interval for β [2 marks]

QUESTION FOUR [10 MARKS]

- a) As part of a study of the treatment of diabetes in patients researchers measured the blood pressure levels in 36 patients who had been injected with insulin. The sample mean of blood pressure was 94 mmHg and the standard deviation was 8mmHg
Construct and interpret a 95% confidence interval for the population mean [5 marks]
- b) A student Nurse at the Kilifi County hospital investigated whether taking physical exercise affected people's chances of getting a cold. 230 clients were monitored for the

study. Out of 115 who did physical exercise 100 people did not get a cold. Out of those who did not take physical exercises 22 got a cold. Is there any reason to believe that physical exercise reduce chances of getting a cold at 5 % level of significance

[5 marks]

SECTION C

QUESTION ONE [20 MARKS]

This is a hypothetical scenario. A researcher is concerned about the increase in throat cancer among men in his home village. He believes that a local herb drink taken by men in the village may be responsible for the cancer. He decides to conduct a case control study in order find out whether there is an association between the herbal drink and throat cancer.

- (a) Briefly describe how this case control study will be conducted? [5 MARKS]
- (b) What are the two sources of control groups? Which would be suited for this study and why? [5 MARKS]
- (c) Discuss 3 advantages and 3 disadvantages of this study design? [6 MARKS]
- (d) If the researcher had unlimited money and time, what study design would give the strongest evidence of an association between the herbal drink and throat cancer? [1 MARKS]
- (e) Briefly discuss the study you named in (c) [3 MARKS]

QUESTION TWO [20 MARKS]

- a) Define the following terms
 - i) sensitivity [1 mark]
 - ii) specificity [1 mark]
 - iii) The predictive value positive of the symptom [1 mark]
 - iv) The predictive value negative of the symptom [1 mark]
 - v) False positive? [1 mark]
 - vi) False negative? [1 mark]

b) A medical research team wished to evaluate a proposed screening test for Alzheimer's disease. The test was given to a random sample of 450 patients with Alzheimer's disease and an independent random sample of 500 patients without symptoms of the disease. The two samples were drawn from populations of subjects who were 65 years or older. The results are as follows.

Test Result	Yes	No	Total
Positive	436	5	441
Negative	14	495	509
Total	450	500	950

- i) Compute the sensitivity of the symptom. [1 marks]
- ii) Compute the specificity of the symptom. [1 marks]
- iii) Suppose it is known that the rate of the disease in the general population is 11.3%.
What is the predictive value positive of the symptom and the predictive value negative of the symptom

[4 marks]

c) A medical researcher wishes to see the pulse rates of smokers are higher than the rates of nonsmokers. Samples of 100 smokers and 100 nonsmokers are selected. The smokers group has a mean rate of 90 with a standard deviation of 5 while the non smokers group has a mean weight of 88 and a standard deviation of 6. Can the researcher conclude, at $\alpha = 0.05$, that smokers have higher pulse rates than nonsmokers? [8 Marks]