NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF ENVIRONMENTAL SCIENCES

DEPARTMENT OF ENVIRONMENTAL HEALTH

BACHELOR OF ENVIRONMENTAL SCIENCE HONOURS DEGREE IN PUBLIC HEALTH

EPIDEMIOLOGY AND BIOSTATISTICS

EPH 2101

Examination Paper

October 2024

This examination paper consists of 3 pages

Time Allowed: 3 hours

Total Marks: 100

Special Requirements:
- Calculator
- Graph paper

Examiner's Name: Mr. T. Chirigo

INSTRUCTIONS
1. Answer question 1 and any other three (3) questions
2. Where a question contains subdivisions, the mark value for each subdivision is given in brackets
3. Illustrate your answer where appropriate with large, clearly labelled diagrams

MARK ALLOCATION

QUESTION	MARKS
1.	25
2.	25
3.	25
4.	25
5.	25
TOTAL	100

SECTION A: Answer ALL questions (25 MARKS)

Question 1

(a) Malnutrition is a common feature of chronic kidney disease, and has been linked to increased mortality among dialysis patients. One important indicator of malnutrition is a low albumin blood level (below 35 g/l). Researchers who wanted to study this phenomenon recruited 15 patients on maintenance dialysis at a large dialysis centre. These are the measurements for the 15 study participants: 39; 36; 33; 34; 30; 28; 34; 29; 21; 32; 39; 35; 33; 34; 27

i.	Calculate the mean and median of the albumin levels	(4)
ii.	Calculate range and interquartile range of the data	(4)
iii.	Calculate the variance and standard deviation	(4)
iv.	Draw a boxplot and comment on the shape of the distribution (symmetry, outliers, etc)	(4)

(b) Below is some computer output:

`. regress weight height`

Source	SS	df	MS		Number of obs = 92
					F(1, 90) = 144.38
Model	31591.6473	1	31591.6473		Prob > F = 0.0000
Residual	19692.2222	90	218.802469		R-square = 0.6160
					Adj R-square = 0.6117
Total	51283.8696	91	563.559006		Root MSE = 14.792

weight	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
height	5.091767	.4237488	12.016	0.000	4.249916 5.933618
_cons	-204.7408	29.15972	-7.021	0.000	-262.6717 -146.8099

(c) Write down the model fitted in this analysis (3)

(d) Interpret the coefficient for height from the model (2)

(e) State and interpret the 95% confidence interval for the coefficient of height (2)

(f) Interpret the R-square value and differentiate it from the Adj R-square value. (2)

SECTION B: Answer ANY three (3) questions (75 MARKS)

Question 2

A cohort study of smoking and lung cancer follows 943 people through time. Of the 943, 133 are smokers. After 4 years of follow-up, 31 cases of lung cancer are identified of which 21 were among smokers.

a. What is the exposure in this study? What is the outcome? (2)

b. Draw up a 2x2 table for this study. (8)

c. What is the overall risk of lung cancer in this cohort? **(2)**
d. Calculate the risk ratio and interpret. Show your working. **(4)**
e. Define causality, and outline how you can determine causality in epidemiology **(9)**

Question 3

(a) Define the term **Epidemiology**, and discuss the implication of this definition. **(15)**

(b) Compare and contrast a cohort study and a case control study in the examination of the association between a named exposure and associated outcome **(10)**

Question 4

For a named disease of your choice, discuss the application of the epidemiological triad in the

      (a) Causation **(12)**
      (b) Prevention and control of the disease **(13)**

Question 5

(a) Using a specific example, identify and discuss the components that constitute the chain of infection/ disease transmission. **(15)**

(b) When carrying out epidemiological studies, epidemiologists encounter various forms of bias. Outline any two sources of bias and discuss how they can be minimised. **(10)**