



AMREF INTERNATIONAL UNIVERSITY
SCHOOL OF PUBLIC HEALTH
DEPARTMENT OF COMMUNITY HEALTH
BSC HEALTH SYSTEMS MANAGEMENT AND DEVELOPMENT /
HEALTH RECORDS AND INFORMATION MANAGEMENT
END OF SEMESTER FINAL EXAMINATION AUGUST 2026

UNIT CODE: HRI 102 / UNIT NAME: Introduction to Medical Statistics

Date : 12th AUGUST 2026

TIME : Two (2) Hours Start-----5:30 PM-----End.....7:30 PM

INSTRUCTIONS

1. This exam is marked out of 70 marks
2. This Examination comprises TWO Sections
Section A: Compulsory Question (30 marks)
Section B: Long Answer Questions (40 marks)

INSTRUCTIONS: Answer Question ONE and any other TWO Questions.

Section A: Answer all questions (30Marks)

Question one (30 Mks)

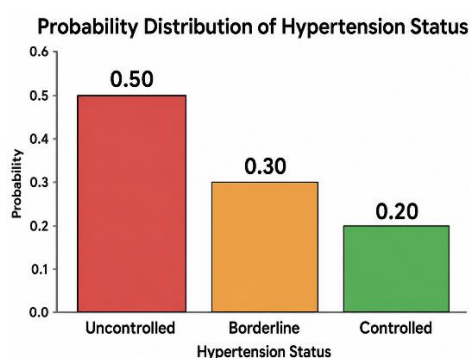
- 1) Distinguish by giving examples in Medical field.
 - i) Nominal and Ordinal Variables (2mks)
 - ii) Type I and Type II error (2mks)
 - iii) Linear and Multiple Regression (2mks)
 - iv) Descriptive Statistics and Inferential statistics (2mks)

2. A county referral hospital is evaluating the recovery time (in days) of patients undergoing a specific orthopedic surgery. A sample of six patients recovering from the surgery was recorded as follows: 12, 15, 14, 10, 18 and x . The Medical Statistician reports that the average recovery time over these six patients is 14 days.

- i. Calculate the missing recovery time (x) (2mks)
- ii. Compute the Standard deviation and COV of the recovery times. (6mks)

- iii. Discuss how variability in recovery times might impact hospital bed turnover and resource allocation. (4mks)

3. Hypertension is a major cardiovascular challenge in Kenya, and a local clinic has been monitoring blood pressure control among adults. Patients are classified into three categories: Controlled, Borderline, and Uncontrolled. The probability that a randomly selected patient falls into a particular category is shown in the table below:



Find the probability that of two randomly selected patients seen by the doctor:

- i) Both will have Uncontrolled hypertension (3 marks)
 ii) Exactly one will have Borderline hypertension (3 marks)
 iii) Neither will have Controlled hypertension (4 marks)

Section B: Answer any two questions (40Marks)

Question Two (20 Mks)

A referral hospital has implemented an electronic health record (EHR) system to track operational efficiency. Hospital management wants to understand how the number of triage nurses on duty and the number of emergency daily arrivals influence the average patient processing time in minutes. A Medical Statistician runs a multiple linear regression in PSPP.

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.250	0.120		10.416	.000
	Number of Triage Nurses on Duty (X_1)	-0.410	0.060	-0.315	-6.833	.000
	Number of Daily Arrivals (X_2)	0.320	0.045	0.425	7.111	.000

a. Dependent Variable: Average Patient Wait Time (minutes),

Residual standard error: 0.608 on 322 degrees of freedom,

Multiple R-squared: 0.4244, **Adjusted R-squared:** 0.4209,

F-statistic: 118.7 on 2 and 322 DF, **p-value:** < 2.2e-16.

- i. Write the regression equation (3 marks)
- ii. What is the predictive power of the model. (1 marks)
- iii. Explain the clinical/operational effect of the Number of Triage Nurses on Duty on patient processing time. (3 marks)
- iv. Explain the effect of the Number of Daily Arrivals on patient processing time. (3 marks)
- v. Identify the variable influences the most, Justify (3 marks)
- vi. Is the model statistically significant? Justify. (3 marks)
- vii. Discuss in two ways how these findings can be utilized by hospital management to optimize emergency department staffing schedules and reduce patient waiting times. (4 marks)

Question Three (20 Mks)

1. A medical laboratory training institute offering Biomedical Sciences and Nursing programs conducted diagnostic competency tests for interns. Below is a PSPP output summary of the test scores (out of 100) for Hematology, Microbiology, Pharmacology, and Anatomy.

Test	N	Minimum	Maximum	Mean	Std. Deviation
Hematology	415	45.20	98.50	72.1520	8.41250
Microbiology	418	50.15	99.10	75.3410	6.21480
Pharmacology	418	32.40	88.60	60.2255	9.55120
Anatomy	418	60.50	95.40	78.4125	4.81230
Valid N (listwise)	410				

- i. State the sample size? (2 marks)
- ii. Calculate the range of Hematology and Pharmacology tests. (4 marks)
- iii. Identify the best performed diagnostic test? Justify. (3 marks)
- iv. Identify the least performed diagnostic test? Justify. (3 marks)
- v. Compare and contrast the standard deviation of the Anatomy test and Pharmacology. (4 marks)
- vi. Calculate the Coefficient of Variation (COV) for Microbiology and Pharmacology tests. (4 marks).

Question Four (20 Mks)

1. Diabetes Mellitus is a chronic non-communicable disease. To improve patient outcomes, a health department in Nakuru conducted a study to examine factors influencing the management of Type 2 Diabetes among patients attending a specialized clinic between 2021 and 2025. As part of the analysis, a Chi-Square test of independence was conducted to determine whether there is a significant relationship

between BMI category (Normal, Overweight, Obese) and Glycemic Control (Good, Poor). The PSPP output below summarises the results:

Chi-Square Tests

	Value	d	Asymp. Sig. (2-sided)
Pearson Chi-Square	58.323 ^a	2	.000
Likelihood Ratio	59.593	2	.000
Linear-by-Linear Association	58.123	1	.000
N of Valid Cases	3411		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 119.61.

- i) Using this case, illustrate how hypothesis testing is conducted (6mks)
- ii) State the sample size (1mks)
- iii) Justify the selection of the Chi-square test for this specific dataset (4mks)
- iv) Was there a statistical difference between Glycemic and BMI, Justify? (4mks)
- v) Discuss how these findings could inform clinical interventions and patient lifestyle management strategies for diabetes care in Nakuru. (5mks)