



**AMREF INTERNATIONAL UNIVERSITY
SCHOOL OF PUBLIC HEALTH
DEPARTMENT OF COMMUNITY HEALTH
HIGHER DIPLOMA IN COMMUNITY HEALTH
END OF SEMESTER EXAMINATION DECEMBER 2024**

UNIT CODE: HDCH 015

UNIT NAME: FUNDAMENTALS OF BIostatISTICS

DATE: WEDNESDAY 3RD DECEMBER, 2024

TIME: TWO HOURS **START:** 4.30PM **FINISH** 6.30PM

INSTRUCTIONS

1. This exam is marked out of 60 marks
2. This Examination comprises TWO Sections
Section A: Compulsory Question (20 Marks)
Section B: Long Answer Questions (40 Marks)
3. All questions in Section A are compulsory
4. Answer any TWO questions in Section B
5. This online exam shall take 2 Hours
6. Late submission of the answers will not be accepted
7. Ensure your web-camera is on at all times during the examination period
8. No movement is allowed during the examination
9. Idling of your machine for 5 min or more will lead to lock out from the exam
10. The Virtual Assessment System (VAS) has inbuilt integrity checks to detect cheating
11. Any aspect of cheating detected during and or after the exam administration will lead to disciplinary measures.
12. In case you have any questions call the unit Lecturer Mr. Ephantus Mwangi on +254710725327 or Head of Department Dr. Faith Muhonja on +254723742370 or ICT related question Mr. Patrick Njine on +254725835496
13. For adverse incidences please write an email to: amiu.examinations@amref.ac.ke

SECTION A: COMPULSORY (20 MARKS).

1. Distinguish by giving examples in Health systems.

- a) Variable and Data (2 Marks)
- b) Null and Alternative Hypothesis (2Marks)
- c) Descriptive and inferential statistics (2 Marks)

2. A Doctor provided you with an SPSS output for sample data for patients on smoking status. The Doctor wanted to know whether gender (male/female) is associated with the smoking status. Below is the output:

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Do you smoke cigarettes? * Gender	402	92.4%	33	7.6%	435	100.0%

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.171 ^a	2	.205
Likelihood Ratio	3.217	2	.200
Linear-by-Linear Association	1.106	1	.293
N of Valid Cases	402		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 17.76.

Was there a statistical difference between gender and Smoking status, Justify?

(4 Marks)

3. The period starting from initial exposure to the diagnosis of the Monkey pox virus is referred to as the incubation period. Below are the incubation periods, measured in days, for a random sample of 8 individuals infected with Monkey. Calculate the following and interpret the result.

10	9.5	7.2	10	6.3	10.5	7.8	10
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- a) sample mean (3mks)
- b) sample variance and standard deviation and CoV (4mks)
- c) Median and the mode (3mks)

SECTION B: ANSWER ANY TWO (2) QUESTIONS (40 MARKS).

4. A manager provided you with an SPSS output for sample data for workplace study on back pain. The manager wanted to know whether Job stressfulness is associated with the Lower Back pain (LBP). Below is the output.

		Is your job stressful?		Total
		stress free	stressful	
Lower Back pain	NoLBP	Count 96	44	140
		% within Lower Back pain 68.6	31.4	100.0%
		% within Is your job stressful? 73.8%	54.3%	66.4%
LBP	Count	34	37	71
		% within Lower Back pain 47.9%	52.1%	100.0%
		% within Is your job stressful? 26.2%	45.7%	33.6%
Total	Count	130	81	211
		% within Lower Back pain 61.6	38.4%	100.0%
		% within Is your job stressful? 100.0%	100.0%	100.0%

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.521 ^a	1	.004		
Continuity Correction ^b	7.669	1	.006		
Likelihood Ratio	8.428	1	.004		
Fisher's Exact Test				.004	.003
Linear-by-Linear Association	8.481	1	.004		
N of Valid Cases	211				

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Lower Back pain * is your job stressful?	211	79.0%	56	21.0%	267	100.0%

- State the hypothesis (4mks)
- What was the sample size? (2mks)
- Which stress category is greatly affected by the LBP? (2mks)
- Which stress category is least affected by LBP? (2mks)
- Why was the Chi square test appropriate in this case? (4mks)
- Was there a statistical difference between stressful job status and Lower Back Pain, Justify? (6mks)

5. The following table shows hemoglobin levels for miners, compute the probabilities described below.

Class Interval for Hemoglobin (g/cc)	Number of Miners
12.0–17.9	24
18.0–21.9	53
22.0–27.9	13
Total	90

Source: Adapted from Dunn, O. J. (1977). *Basic Statistics: A Primer for the Biomedical Sciences*, 2nd Edition. Wiley, New York, p. 17.

- a) Compute the probability that a miner selected at random from the population has:
- i. a hemoglobin level in the 12.0–17.9 range. (3mks)
 - ii. a hemoglobin level in the 18.0–21.9 range. (3mks)
- b) During a study, data on the following variables was collected for each patient in a hospital ward (see table). For each of the following variables, state whether it is qualitative or quantitative (**type**); hence further classify into either nominal, ordinal, discrete or continuous (**sub type**). (14mks)

Variable	Type	Sub type
Exact age of a patient (in years)		
Weight (in grams)		
Height (in meters)		
Systolic blood pressure		
Blood type		
Sickness description		
Smoking (Yes or No)		

6. A statistician provides a SPSS output in for a sample dataset that had test scores (out of 100) on four placement tests: English, Reading, Math, and Writing. Below is the output

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
English	431	59.83	101.95	82.7265	6.82982
Reading	435	55.11	103.62	82.0394	7.63745
Math	435	35.32	93.78	65.4512	8.29165
Writing	435	64.06	93.01	79.5392	5.50151
Valid N (listwise)	431				

Required

- a) What is the sample size? (2mks)
- b) Calculate the range of English and Writing test? (3mks)
- c) which was the most passed placement test? Justify (2mks)
- d) Which was the worst performed placement test? Justify. (2mks)
- e) Comment on the std deviation of the placement tests? (2mks)
- f) Calculate the coefficient of variance of the Math and reading test? (4mks)
- g) Outline steps to conduct hypothesis testing illustrating using a clinical example or case (5mks)