

UNIVERSITY OF SWAZILAND
FACULTY OF HEALTH SCIENCES

FINAL EXAMINATION MAY 2005

PROGRAMME : BACHELOR OF NURSING SCIENCE

COURSE : HSC 402

TITLE OF PAPER : HEALTH SYSTEMS RESEARCH AND
STATISTICS

DURATION : 3 HOURS

MARKS: : 100

INSTRUCTIONS

1. ANSWER **FOUR** QUESTIONS FROM **SECTION A** AND **TWO** QUESTIONS FROM **SECTION B**
2. WRITE EACH QUESTION ON A SEPARATE SHEET OF PAPER
3. A **FORMULA SHEET** AND **GRAPH** ARE PROVIDED FOR YOU
4. CALCULATORS MAY BE USED BUT THEY MUST BE THE SILENT TYPE

DO NOT OPEN THIS PAPER UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATOR.

SECTION A : INTRODUCTION TO HEALTH STATISTICS

PART A : Answer ALL the questions in this part. Each question is 10 marks.

QUESTION 1

a. Write out the terms in each of the following indicated sums :

i. $\sum_{i=1}^n (x_i - a)$ (2)

ii. $\sum_{i=2}^4 a$ (2)

iii. $\sum_{i=1}^n f_i x_i$ (2)

b. Express each of the following by using the summation notation :

i. $a_1b_1 + a_2b_2 + a_3b_3 + \dots + a_nb_n$ (2)

ii. $\frac{x_1}{a} + \frac{x_2}{a} + \frac{x_3}{a}$ (2)

[10 marks]

QUESTION 2

Thirteen patients with severe chronic airflow limitation were the subjects of a study by Fernandez et al. who investigated the effectiveness of a treatment to improve gas exchange in such subjects. The following are body surface areas (m^2) of the patients.

2.10 1.74 1.68 1.83 1.57 1.71 1.73
1.65 1.74 1.57 2.76 1.90 1.77

a. Use the data to compute the :

i. mean (2)

ii. median (2)

iii. mode (2)

iii. variance (2)

iv. standard deviation (2)

[10 marks]

QUESTION 3

- a. A cross-sectional snail survey was conducted in the Gezira Irrigation Scheme during a one month period. The results below show the total number of snails of different species that were found :

Snail Species	Number Collected from 100 Sites
<i>Biomphalaria pfeifferi</i>	6 005
<i>Bulinus truncates</i>	5 922
<i>Bulinus forskalii</i>	500
<i>Lymnaea natalensis</i>	200
<i>Melanooides tuberculata</i>	1 202
<i>Cleopatra bulimoides</i>	1 500
Other	200
TOTAL	15 529

- i. Represent this information on a pie chart. (3)
- ii. Write a plausible interpretation of the pie chart. (1)
- b. Evaluate :
- i. $5P_2$ (2)
- ii. $7C_5$ (2)
- iii. the number of ways in which 10 tuberculosis patients may be slept in private ward that has only 4 beds. (2)

[10 marks]

PART B : ANSWER ANY TWO QUESTIONS FROM THIS SECTION.

QUESTION 4

The following are ages of 30 patients seen in the emergency room of a hospital on a Friday night.

35	32	21	43	39	60
36	12	54	45	37	53
45	23	64	10	34	22
36	45	55	44	55	46
22	38	35	56	45	57

a. From this data construct :

- i. a frequency distribution (3)
- ii. a frequency polygon (2)

b. Use your frequency distribution to compute the :

- i. mean (2)
- ii. median (2)
- iii. mode (2)
- iv. 60th percentile (2)
- v. upper quartile (2)

[15 marks]

QUESTION 5

The following are the systolic blood pressures (mmHg) of 12 patients undergoing drug therapy for hypertension :

183	152	178	157	194	163
144	114	178	152	118	158

Can we conclude on the basis of their data that population mean is less than 165 ?

Let $\alpha = 0.05$

[15 marks]

QUESTION 6

In a schistosomiasis survey two microscopists both examined a number of kato smears as part of a quality control.

Slide	Observer 1	Observer 2
1	45	49
2	34	32
3	0	0
4	20	24
5	52	47
6	10	9
7	72	75
8	0	1
9	11	10
10	40	34

Determine whether there is a significant relationship between the readings of Observer 1 and Observer 2.

[15 marks]

SECTION B : HEALTH SYSTEMS RESEARCH METHODS

Answer all questions in this section

QUESTION 7

- A The most basic classification of research found in most textbooks is between applied and basic research. How would you differentiate these two research types.....(2)
- B How would you distinguish a null hypothesis from a research hypothesis.....(2)
- C Briefly describe the mechanisms that can be used to ensure anonymity of participants in a research study.....(3)
- D A group of nursing leaders studying research methodology hypothesized that hospital readmission of male tuberculosis patients is caused by the patients' lack of education about their disease. Identify the following:
- a) dependent variable.....(1)
 - b) independent variable.....(1)
 - c) extraneous variables.....(1)

E Match the following statements with the concept it describes [5]. For example 1p

Statement : Column A	Study type Column B
1 the investigator compares one group among whom a problem is present with another group where the problem is absent to find out what factors have contributed to the problem	a Experimental b Descriptive c Exploratory
2 attempts to establish causes or risk factors for certain problems. This is done by comparing two or more groups some of which have or develop the problem and some have not.	d Analytical e Case-control studies
3 Involves the systematic collection and presentation of data to give a clear picture of a particular situation.	
4 A small-scale study of relatively short duration, which is carried out when very little is known about a situation or a problem.	
5 Individuals are randomly allocated to at least two groups. One group is subject to intervention while the other is not. The outcome of the intervention is obtained by comparing the two groups.	

F Data collection techniques allow researchers to systematically collect information about study objects of study and about the settings in which they occur. Provide one advantage and one disadvantage of each of the following data collection techniques.....[10]

- Using available information..... [2]
- Observing..... [2]
- Small-scale flexible interviews..... [2]
- Interviewing..... [2]
- Administering a written questionnaire..... [2]

G Identify the sampling method used in the following examples.....[5].

- i) A researcher wants to study the attitudes of community members towards family planning services provided by the Family planning clinic. He decides to interview adult patients who visit the outpatient clinic during one particular day.
- ii) The researcher of the family planning study just mentioned suspects that religion might have a strong effect on patients' attitudes towards the family planning services. He is afraid to miss the Catholics, who are a minority in the area. He therefore decides to include in the study 60 patients from each of the different religious groups and to extend the study over 3 or 4 days to obtain the desired sample
- iii) In a study of the knowledge, attitudes, and practices related to family planning in rural communities of Hhohho region, a list is made of all villages. Using this list, a random sample of villages is chosen and all the adults in the selected villages are interviewed
- iv) In a study of utilization of pit latrines in a district, 150 homesteads are to be visited for interviews with family members as well as for observations on types and cleanliness of latrines. The district is composed of chiefdoms and each chiefdom has between 6 and nine Tinkhundla
- v) A survey is conducted on household water supply in a region comprising 20 000 households, of which 20% are urban and 80% rural. It is suspected that in urban areas the access to safe water sources is much more satisfactory. A decision is made to include 100 urban households and 200 rural households.

(25 marks)

QUESTION 8

- 1 The following concepts are commonly used in qualitative studies. Briefly explain the meaning of the following terms:
- A Triangulation.....(2)
 - B Probing.....(2)
 - C Appropriateness.....(2)
 - D The method of sampling in qualitative research must be both appropriate and adequate. State how you would ensure appropriateness of the sample?.....(4)

E What are the advantages of focus group discussions.....(5)

F Discuss how you would ensure trustworthiness of data obtained through use of focus group discussions.....(10)

(25 marks)