Resident Student Perceptions of On-Campus Living and Study Environments at the University of Namibia and their Relation to Academic Performance

by

Isak Neema

A Project

Submitted to the Faculty
of the

WORCESTER POLYTECHNIC INSTITUTE

In partial fulfillment of the requirements of the

Degree of Master of Science

in

APPLIED STATISTICS

by

_____

May 2003

APPROVED:

_____

Professor Joseph D.Petruccelli

_____

Professor Bogdan Vernescu, Department Head

ABSTRACT

This study measures resident student perceptions of on–campus living and study environments at the University of Namibia campus residence and their relation to student academic performance. Data were obtained from a stratified random sample of resident students with hostels (individual dormitory) as strata. Student academic performance was measured by grade point average obtained from the university registrar. Student perceptions of living and study environments were obtained from a survey. Inferences were made from the sample to the population concerning: student perceptions of the adequacy of the library and campus safety, and differences in perceptions between students living in old-style and new-style hostels. To relate student perceptions to academic performance, a model regressing GPA on student perception variables was constructed. The principal findings of the analyses were that (1) Student perceptions do not differ between old and new hostels; (2) There is an association between time spent in the hostel and the type of room, ability to study in room during the day and the type of room, ability to study in room at night and the type of room, time spent in hostel and number of times student change blocks, ability to study in room at night and availability of study desk in room, ability to study in room at night and availability of study lamp in room, effectiveness of UNAM security personnel and safety studying at classes at night and also between effectiveness of UNAM security personnel and student perception on whether security on campus should remain unchanged respectively; (3) Mean GPA differs with respect to the type of room, ability to study in room during the day, time spent in hostel, number of times student change blocks, current year of study, time spent on study, students who are self-catering, sufficiency of water supply in blocks and also with students who are enrolled in Law and B.Commerce field of study and with students receiving financial support in the form of loans. (4) The variables found to be significant in the regression model were Law field of study, double rooms, inability to study in room during the day and self-catering respectively.

ACKNOWLEDGEMENTS

I would first like to thank Professor Joseph D. Petruccelli, my major advisor, for the guidance and confidence he has given to me. It has been a wonderful experience and I have learned more than you can imagine.

A great deal of thanks is also extended to my off campus advisor Dr N.O. Ama for his willingness to work with me during the data collection process of this study. Thank you for the support and advice that you gave me throughout the course of this great project. Thank you to Erik Barry Erhardt for his programming and computer wizards and his willingness to help me when needed. Thanks a lot.

I would also like to thank my friends for their moral support, my mom, dad you have been there every step of the way and I appreciate you more than you know.

Lastly, I would like to extend a word of thanks to my sponsors, the African American Institute (AAI) and the University of Namibia (UNAM) for providing the financial support and the environment from which this study has been conducted. Thank you.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. PROBLEM DESCRIPTION

1.1. Introduction

In this study, we want to measure student perceptions of on – campus living and study environments at the University of Namibia campus residence and their relation to student academic performance. We will use student Grade Point Average (GPA) to measure the academic performance of the students.

1.2. Goals and objectives of the study

The objectives of this study are:

1. To obtain student perceptions on living and study variables thought to affect the living and study environments of student at the University of Namibia campus residence.
2. To identify those variables from 1, which are significantly related to student GPA.
3. To relate those variables identified in 2 to student GPA.

1.3. Research questions

The study addressed the following questions.

1. Do the responses given by the respondents from the two hostels differ?
2. Do students feel that the library provides sufficient study materials to help them in their studies?
3. Do students feel that the campus residence is safe enough in terms of studying at classes at night, safety in their rooms and the performance of the security personnel?
4. Is there any correlation between the living and study variables and student GPA?

The variables we chose to measure the living and study environments are listed below. In these variables, a hostel is a place where student housing and catering needs are provided. The hostels at the University of Namibia consist of two separate units of blocks (dormitories) of residence known as New and Old hostels. Data were obtained on two types of variables thought to be related to GPA by conducting a survey of a random sample of resident students: variables measuring the living environment, and variables measuring the study environment:

1.3.1. Variables measuring the living environments are:

1. Time spent in hostel
2. Type of room
3. Number of times student changes blocks
4. Ability to study in room during the day
5. Ability to study in room at night
6. Sources from where students obtains their meals
7. Satisfaction with the level of services provided by the catering departments
8. Sufficiency of water supply in the hostels
9. Safety in rooms
10. Effectiveness of UNAM security personnel
11. Should security on campus remain unchanged?

1.3.2. Variables measuring the study environments are:

1. Field of study
2. Current year of study
3. Financial assistance
4. Time spent on study
5. Sufficiency of study rooms
6. Library facilities
7. Safety studying at classes at night

8. Availability of study desk in room
9. Availability of study chair in room
10. Availability of study lamp in room

Throughout the course of this study we will refer to the variables measuring the living environments as living variables and variables measuring the study environments as study variables. With the help of my advisor and the head of Department of Statistics at the University of Namibia, we develop and administer the questionnaire that asses students perceptions on these variables.

1.4. Characteristics of the studied institution

The University of Namibia or as it is commonly called UNAM, was established in 1992, just two years after the country's independence. The campus is situated on the outskirts of the city of Windhoek, about 20 miles from the city center. Before the university was formed, the campus was mainly used as a higher school known by the name of Academy, which provided under one management the Technikon and a College (Republic of Namibia 1991). Today the UNAM student population comprises of a multi-cultural society, with students coming as far as from such foreign countries as, Zambia, Zimbabwe, South Africa, Tanzania, Germany, the United States, China, and France. The chancellor of the University of Namibia is the head of state, president Sam Nuyoma, who is also one the founding fathers of the institution.

The University of Namibia comprises of the following faculties

- Faculty of Agriculture
- Faculty of Economics and Management Science
- Faculty of Education
- Faculty of Humanity and Social sciences

- Faculty of Law
- Faculty of Medical and Health Sciences and
- Faculty of Science

The University is involved in many national and international programs such as student exchange programs, staff development programs, and staff exchange programs in collaboration with universities and other institutions outside Namibia. UNAM has three academic terms: first term that runs February to May, second term that runs June to September, and third term that runs from the end of September to December.

Nearly half of the students studying at UNAM live on campus, although there are alternative accommodations provided by the institution outside the campus. For students living outside the campus, the university provides transport to and from campus.

Apart from gaining education at UNAM, students are also widely involved in other extra curricular activity such as sport and festivals. Sport is highly regarded on campus as a means of student interaction and relaxation. The university pleads its support for sports on campus by sponsoring events like soccer tournaments and athletic meetings.

1.5. Rationale of the study

This study was conducted with the help of the head of the Department of Statistics at the University of Namibia, Dr. N.O.Ama. Dr. Ama played a major role in reviewing and amending the questionnaire used in collecting data from students, (see Appendix I) and in monitoring the data collection process.

This study has provided data on student assessment of the environments where they live and study, and in addition it has provided information on student assessment of the availability of library facilities in helping students in their studies, availability of study

rooms, the quality of safety on campus and the involvement of government, institution and parents in providing funds to students. It has further highlighted the relationships between the living and study variables and student GPA.

We hope that the information collected will be useful to the University management and the government of Namibia, in defining their priority areas at the University when preparing and approving the budget of the institution. The information will also help the University management in determining rules and principles on safety, expansion of facilities and effective rules in guiding students' accommodation. Other organizations, NGO's (Non-Governmental organizations), Donor Agencies and local investors interested in helping the University, will find the information obtained useful, as they would be able to determine areas where they can assist (Dr. N.O. Ama, 2001).

2. DATA GENERATION

2.1. Design Methodology

2.1.1. Target population

The survey targets only those students living on campus irrespective of their academic years of study or background who have been at UNAM for at least a year. Day students were not part of this study, hence they were not included in any data collection of this survey. By day student we are referring to those students who are residing off campus (not living on campus) and only come to UNAM to attend classes.

2.2. How the survey was conducted

The survey was divided into three phases.

- Phase 1 was conducted at WPI. The tasks accomplished were the planning of the study and writing the proposal.

- Phase 2 was conducted at the University of Namibia. The task accomplished was the implementation of the survey.

- Phase 3 was conducted at WPI. Tasks accomplished were the analysis of the data and report writing and compiling.

2.3. How data were collected

The data used in this study were collected from the following sources:

2.3.1 Office of the Registrar

The data that were collected from the registrar's office were student Grade Point Averages (GPA) from the 2001 – 2002 academic years, which represent the student performances over the past year.

2.3.2. From the students residing on campus

The data that were collected from the students where the data on variables measuring the living and study environment of students on campus. These were obtained by filling out a questionnaire during interviews with the students.

2.4. Structure and nature of the campus residence

The UNAM campus residence consists of two separate units of blocks (dormitories) of residence normally called New and Old hostels. In the hostels student housing and catering needs are provided.

2.4.1. Characteristics of the hostels

2.4.1.1. Old hostels

The old hostels are the original student residence erected before the institution became a university. The old hostels consist of blocks **A** to **C**. Each of these blocks has up to 128 bedding rooms for students.

2.4.1.2. New hostels

The new hostels were built primarily with the aim of accommodating the increasing number of students seeking accommodation each year. They where built with the purpose of eradicating housing problems on campus, although lack of accommodation is one of the problems that students still face each year. The new hostels consist of blocks **A** to **K**, with each block consisting of 58 bedding rooms.

Overall the total population of students residing on campus is 1095.

2.4.2. Hostel management

The management of the hostels is overseen by a top management committee of accommodation and the housing committee members (HC). The top management consists of, the head of accommodation, a deputy head, and secretaries.

The HC are students elected annually by the hostel residents to represent and administer the welfare of their respective blocks. Each block elects its own housing committee.

2.5. Sample and Sampling procedure

To select our sample, we used a stratified sampling with the 14 strata consisting of the 14 residence blocks. We decided to use stratified sampling, because we felt that the student experiences might differ from block to block. The strata were as follows:

Stratum 1 is A block (OH)

Stratum 2 is B block (OH)

Stratum 3 is C block (OH)
Stratum 4 is A block (NH)
Stratum 5 is B block (NH)
Stratum 6 is C block (NH)
Stratum 7 is D block (NH)
Stratum 8 is E block (NH)
Stratum 9 is F block (NH)
Stratum 10 is G block (NH)
Stratum 11 is H block (NH)
Stratum 12 is I block (NH)
Stratum 13 is J block (NH)
Stratum 14 is K block (NH)

Where OH abbreviates old hostel and NH is new hostel.

The total population of students residing in the hostels in the 2002 academic year was **1095** students, of whom **203** were first year students. Since first year students were not part of this survey, this brought the total population of students to be surveyed to **892**. Table below represents the distribution of students in each block.

Table 1: Distribution of students in the blocks

Old Hostels

Blocks	Number of students in the block	Number of 1st year students in the block	Number of students excluding 1st year students (N_h)	Cost per block	W_h
A	135	38	97	**N$**120	0.1087
B	137	35	102	**N$**120	0.1144
C	132	42	90	**N$**120	0.1009

New Hostels

A	66	6	60	**N$**90	0.0673
B	65	3	62	**N$**90	0.0695
C	64	3	61	**N$**90	0.0684
D	63	10	53	**N$**90	0.0594
E	64	3	61	**N$**90	0.0684
F	62	10	52	**N$**90	0.0583
G	65	9	56	**N$**90	0.0628
H	65	13	52	**N$**90	0.0583
I	60	11	49	**N$**90	0.0549
J	60	12	48	**N$**90	0.0538
K	57	8	49	**N$**90	0.0549
Total	1095	203	892	**N$1350**	1.0000

Where:

- Cost per block is the estimated cost involved in collecting data in a specific block.
- $\mathbf{W_h}$ is the proportion of the total number of students residing in the hostels who are currently living in the h-block **($W_h = N_h/N$)**.

2.5.1. Allocation of sample size

The method of proportion allocation was used in determining the sample size to be drawn from each stratum (Bowley, 1926). This means that n_h, the number sampled from stratum h is proportional to N_h, the number in stratum h. If n is the total sample size and N the population size, $n_h = (n/N)*N_h$.

The cost of sampling must be factored in to the determination of sample size. Suppose that:

C = Total cost (Fixed total cost)

Co = Overheard cost

$\mathbf{C_h}$ = Cost for stratum h.

Then the total sample size for fixed total cost (Total cost), the cost earmarked for the whole project operation, is given by:

$$\mathbf{n = [C - Co]/ \sum_{h=1}^{14} W_h C_h \ , \quad h=1, 2,\ldots\ldots\ldots, 14}$$

2.5.1.1. Calculation of the total sample size

$\sum_{h=1}^{14} \mathbf{W_h C_h} = 99.72$, h = 1, 2, 3, ……., 14

C = **N$**59240.00

Co = **N$**13500

$N_h = 892$

Thus,

$$\mathbf{n = [C - Co]/ \sum_{h=1}^{14} W_h C_h}$$

$$\mathbf{= [59240 - 13500]/ 99.72}$$

$$\mathbf{= 458.68}$$

Hence, n ≈ 459

But, in order to keep under budget we will need our sample size to be **n <= 458.**

The size of the sample to be drawn from stratum h is determined using the following equation.

$$\mathbf{n_h} = [\mathbf{n/N}]\ \mathbf{N_h} \qquad h = 1, 2, 3\ldots\ldots\ldots, 14$$
$$= [459/\ 892]\ N_h$$
$$= 0.5146\ N_h$$

The table below represents the calculated sub - sample sizes to be drawn proportionally from each stratum.

Table 2: Summary of the sub-sample size to be drawn from the strata

Stratum	Size of the stratum (N_h)	n_h
1	97	50
2	102	53
3	90	46
4	60	31
5	62	32
6	61	31
7	53	27
8	61	31
9	52	27
10	56	29
11	52	27
12	49	25
13	48	25
14	49	25
Total	892	459

(University of Namibia, 2002)

Simple random sampling was used to draw the sample from each stratum. That is, in each stratum, the sample was selected so that all possible units had equal probabilities of being included in the sample. In this study we used a random number table to select all samples (Rao et al, 1974).

2.6. Limitation of the study

The study is limited to those students receiving their tertiary education at the University of Namibia main campus. First year students were not included in the study since it was decided that the student should have spent at least a year in the institution so as to be able to give a good appraisal of the prevailing conditions.

A questionnaire was designed to collect data from students. See Appendix I for the attached sample questionnaire.

2.7. Quality control

A sample survey having a good sample design and a good data form can still yield poor data if the execution of the survey is poor. An important part of a survey design is to ensure that the execution of the survey is in accordance with the design. In particular, there should be some formal quality control procedures instituted on both the data collection method and the data processing components of the survey.

In ensuring the quality of the data to be collected, a pilot study was conducted. A pilot study is generally a full-scale dress rehearsal of the survey. It includes testing not only of the data collection procedures but also the questionnaire and all other components of the survey, from the sampling to the data processing and analysis. Sometimes a pilot study (survey) may test two or more forms of data collection procedures, and the final

procedures used for the survey may depend on the evaluation of the data collected from the pilot study. In addition, the pilot study may provide estimates necessary for determining the size of the sample needed in the actual survey so that final estimates may be made with stated precision.

3. MATERIALS AND METHODS

3.1. Materials

Two Statistical packages that were used in analyzing the data are:

- SPSS 10.0
- SAS 8.2

3.2. Methods

3.2.1. Distribution of questionnaire

Two persons were used to assist in the data collection process. In order to train them on how to collect quality data, two sessions (one a day for two days) were conducted. These personnel were closely monitored during the data collection process and their completed questionnaires were cross-checked in order to ensure that quality data were collected. Incomplete questionnaires were returned to the respective interviewers for re-interview.

An interview was conducted in order to get better results. The interview took place late in the evening, because we believed that during that time students would be in their rooms. Individuals who were included in the sample were thoroughly briefed on the importance of the survey.

Provisions for follow-up visits were made for those students not in their rooms at the time the interview was scheduled. Follow-ups were continued until each interview was completed. The data collection process took us five weeks to complete successfully.

3.2.2. Data entry and analysis

We divide the sample size randomly into two parts, the first part is called the test sample size and consist of n = 25. The test sample was used to validate the questionnaire (pilot study). While the second part of the sample is called the training sample and consist of n = 434, the sample size used in the main study.

Data entry was done in SPSS 10.0, and we have also used the SPSS 10.0 in the first part of data analysis, to summarize the data in tables with respect to the sex of the respondents (cross tabulation), to compare how various groups of students responded to each question, and to calculate cumulative percentages, percentages including non-respondents and so on. In the second part of the data analysis we use the SAS 8.2 program to regress the successful learning measures (GPA) on the various variables that we found to affect the quality of living on campus.

3.2.3. Methods used in analyzing the data

The methods used in analyzing the data were:

3.2.1. Cross Tabulations

Cross Tabulations are frequency tables normally associated with surveys, primarily used for summarizing the outcome of the survey as perceived by the respondents. A cross tab may indicate existence of a relationship between two variables at the nominal/ordinal levels of measurement

3.2.2. Fisher's Exact Test

For 2 ×2 tables, Fisher's exact test is the probability of observing a table that gives at least as much evidence of association as the one actually observed, given that the null hypothesis is true. The row and column margins are assumed to be fixed. The hypergeometric probability, p, of every possible table is computed, and the p-value is defined as

$$PROB = \sum_{A} p$$

For a two-sided alternative hypothesis, A is the set of tables with p less than or equal to the probability of the observed table. A small two-sided p-value supports the alternative hypothesis of association between the row and column variables.

One-sided tests are defined in terms of the frequency of the cell in the first row and first column (the (1,1) cell). For a left-sided alternative hypothesis, A is the set of tables where the frequency in the (1,1) cell is less than or equal to that of the observed table. A small left-sided p-value supports the alternative hypothesis that the probability of an observation being in the first cell is less than expected under the null hypothesis of independent row and column variables.

$R \times C$ Tables Fisher's exact test was extended to general $R \times C$ tables by Freeman and Halton (1951), and this test is also known as the Freeman-Halton test. For $R \times C$ tables, the two-sided p-value is defined as it is for 2 ×2 tables. A is the set of all tables with p less than or equal to the probability of the observed table. A small p-value supports the alternative hypothesis of association between the row and column variables. For $R \times C$ tables, Fisher's exact test is inherently two-sided. The alternative hypothesis is defined only in terms of general, and not linear, association.

3.2.3. The Cochran Mantel-Haenszel Test (CMH)

Assessing association for the sets of 2 x r tables involves a strategy of computing means based on a scoring system and looking at shifts in location. Thus for the 2 x r table under the null hypotheses of no association, the probability model is:

$$\Pr(n_h \mid Ho) = \prod_{h=1}^{14}\{\{\prod_{i=1}^{2} n_{hi+}!\prod_{j=1}^{r} n_{h+j}!\}/\{n_h!\prod_{i=1}^{2}\prod_{j=1}^{r} n_{hij}!\}\}$$

where n_{hij} represents the number of observations in the h^{th} stratum corresponding to the i^{th} block and the j^{th} variable level. Suppose $\{ a_{hj} \}$ is a set of scores for the response levels in the h^{th} stratum. Then the sum of strata score for the first treatment test is computed as:

$$f_{+1+} = \sum_{h=1}^{14}\sum_{j=1}^{r} a_{hj}\, n_{h1j} = \sum_{h=1}^{14} n_{h1+}\,(f_{h1})\text{hat}$$

where $(f_{h1})\text{hat} = \sum_{j=1}^{r} (a_{hj}\, n_{h1j}/n_{h1+})$

is the mean score from group 1 in the h^{th} stratum. Under the null hypotheses of no association, f_{+1+} has the expected value:

$$E(f_{+1+} \mid Ho) = \sum_{h=1}^{14} n_{h1+}\mu_h = \mu^*$$

and variance:

$$V(f_{+1+} \mid Ho) = \sum_{h=1}^{14} \{n_{h1+}(n_h - n_{h1+})/(n_h - 1)\}\nu_h = \nu^*$$

where $\mu_h = \sum_{j=1}^{r} (a_{hj}\, n_{h+j}/n_h)$ is the finite population mean and

$$\nu_h = \sum_{j=1}^{r} (a_{hj} - \mu_h)^2 (n_{h+j}/n_h)$$ is the variance of scores for the h^{th} stratum

If the cross –strata sample size $n_{+i+} = \sum_{h=1}^{14} \sum_{j=1}^{r} n_{hij}$ are sufficiently large, then f_{+1+} has approximately a normal distribution. The extended Mantel-Haenszel correlation statistics (Q_{CSMH}) for the association of two variables that were ordinal in nature for a combined set of strata, based on assigning scores {a} and {c} to the columns and rows of the table is:

$$Q_{CSMH} = \{\sum_{h=1}^{14} n_h[(f_h)\text{hat} - E[(f_h)\text{hat} \mid H_0]]\}^2 / \{\sum_{h=1}^{14} n^2_h \, \text{var}[(f_h)|H_0]\}$$

$$= \{\sum_{h=1}^{14} n_h \, (\nu_{hc}\nu_{ha})^{1/2} \, \text{rca,h}\}^2 / \{\sum_{h=1}^{14} [n^2_h \nu_{hc}\nu_{ha}/(n_h - 1)]\}$$

Q_{CSMH} is approximately chi-square distribution with one degrees of freedom when the combined strata sample size are sufficiently large that is $\sum_{h=1}^{14} n_h \geq 40$

3.2.4. Model selection and fitting

Model selection and fitting (or model building) is a process that we will use to develop the regression model that relates the living and study variables to student GPA.

3.2.5. Evaluation of model fits

Evaluation of the fitted model is the final step in the model building process, which is used to validate the selected regression model after remedial measures have been taken and diagnostics analyzed to make sure that the remedial measures were successful.

4. ANALYSIS

4.1. Respondents view as summarized according to the type of hostels

We begin our analysis by first assessing and comparing student perceptions according to the type of hostel. In order to do so we cross-tabulate hostel type (old or new) with a number of living and study variables of interest. The results are presented in Tables 3 to 16. In the tables, the cell entries, from top to bottom, represent the frequency, the expected frequency under the assumption of independence, the column and total percentages within the hostel groupings.

Table 3: Cross tabulation of the respondent's age categories and the type of hostel.

Age categories	Type of hostel		Total
	Old hostel	New hostel	
19 or less	24	55	79
Expected count	24.9	54.1	79.0
Column wise %	17.5%	18.5%	18.2%
Total %	5.5%	12.7%	18.2%
20 – 29	110	237	347
	109.5	237.5	347.0
	80.3%	79.8%	80.0%
	25.4%	54.6%	80.0%
30 and above	3	5	8
	2.5	5.5	8.0
	2.2%	1.7%	1.8%
	0.7%	1.1%	1.8%

Total	137 137.0 100% 31.6%	297 297.0 100% 68.4%	434 434.0 100% 100%

Table 4: Cross tabulation of the respondent's current year of study and the type of hostel.

Current year of study	Type of hostel		Total
	Old hostel	New hostel	
2nd year	64 65.3 46.7% 14.7%	143 141.7 48.1% 32.9%	207 207.0 47.7% 47.7%
3rd year	40 41.7 29.2% 9.2%	92 90.3 31.0% 21.2%	132 132.0 30.4% 30.4%
4th year	30 28.7 21.9% 6.9%	61 62.3 20.5% 14.1%	91 91.0 21.0% 21.0%
5th year	3 0.9 2.2% 0.7%	0 2.1 0% 0%	3 3.0 0.7% 0.7%
6th year	0 0.3 0%	1 0.7 0.3%	1 1.0 0.2%

	0%	0.2%	0.2%
Total	137 137.0 100% 31.6%	297 297.0 100% 68.4%	434 434.0 100% 100%

Table 5: Cross tabulation of the financial assistance of the respondents and the type of hostel.

Financial assistance	Type of hostel		Total
	Old hostel	New hostel	
Scholarship	17 20.6 12.4% 3.9%	48 44.4 16.2% 11.1%	65 65.0 15.0% 15.0%
Loan	90 81.9 65.7% 20.8%	169 177.1 57.1% 39.0%	259 259.0 59.8% 59.8%
Sponsored by parents	30 34.5 21.9% 6.9%	79 74.5 26.7% 18.2%	109 109.0 25.2% 25.2%
Total	137 137.0 100% 31.6%	296 296.0 100% 68.4%	433 433.0 100% 100%

Table 6: Cross tabulation of the time spent in hostel and type of hostel.

Time Spend in the hostel (years)	Type of hostel		Total
	Old hostel	New hostel	
0	23 26.2 16.8% 5.3%	60 56.8 20.2% 13.8%	83 83.0 19.1% 19.1%
1	35 39.5 25.5% 8.1%	90 85.5 30.3% 20.7%	125 125.0 28.8% 28.8%
2	45 41.0 32.8% 10.4%	85 89.0 28.6% 19.6%	130 130.0 30.0% 30.0%
3	28 26.2 20.4% 6.5%	55 56.8 18.5% 12.7%	83 83.0 19.1% 19.1%
4	6 4.1 4.4% 1.4%	7 8.9 2.4% 1.6%	13 13.0 3.0% 3.0%
Total	137 137.0 100% 31.6%	297 297.0 100% 68.4%	434 434.0 100% 100%

Table 7: Cross tabulation of the type of room and type of hostel.

Type of room	Type of hostel		Total
	Old hostel	New hostel	
Single room	120 123.1 87.6% 27.6%	270 266.9 90.9% 62.2%	390 390.0 89.9% 89.9%
Double room	17 13.9 12.4% 3.9%	27 30.1 9.1% 6.2%	44 44.0 10.1% 10.1%
Total	137 137.0 100% 31.6%	297 297.0 100% 68.4%	434 434.0 100% 100%

Table 8: Cross tabulation of the number of times the respondents changed blocks and type of hostel.

Number of times the respondents changed blocks	Type of hostel		Total
	Old hostel	New hostel	
0	77 87.1 56.2% 17.7%	199 188.8 67.0% 45.9%	276 276.0 63.6% 63.6%
1	37 32.5	66 70.5	103 103.0

	27.0% 8.5%	22.2% 15.2%	23.7% 23.7%
2	15 11.0 11.0% 3.5%	20 24.0 6.8% 4.6%	35 35.0 8.1% 8.1%
More than twice	8 6.3 5.8% 1.8%	12 13.7 4.0% 2.8%	20 20.0 4.6% 4.6%
Total	137 137.0 100% 31.6%	297 297.0 100% 68.4%	434 434.0 100% 100%

Table 9: Cross tabulation of the ability to study in room during the day and type of hostel.

Ability to study in room during the day	Type of hostel		Total
	Old hostel	New hostel	
Yes	83 82.6 60.6% 19.2%	178 178.4 60.1% 41.1%	261 261.0 60.3% 60.3%
No	54 54.4 39.4% 12.5%	118 117.6 39.9% 27.3%	172 172.0 39.7% 39.7%

Total	137 137.0 100% 31.6%	296 297.0 100% 68.4%	433 433.0 100% 100%

Table 10: Cross tabulation of the ability to study in room at night and type of hostel.

Ability to study in room at night	Type of hostel		Total
	Old hostel	New hostel	
Yes	110 107.9 80.3% 25.4%	231 233.1 78.0% 53.3%	341 341.0 78.8% 78.8%
No	27 29.1 19.7% 6.2%	65 62.9 22.0% 15.0%	92 92.0 21.2% 21.2%
Total	137 137.0 100% 31.6%	296 296.0 100% 68.1%	433 433.0 100% 100%

Table 11: Cross tabulation of the time spent on studying and type of hostel.

Time spent on study	Type of hostel		Total
	Old hostel	New hostel	
2 hours or less	80 76.4 58.4% 18.4%	162 165.6 54.5% 37.3%	242 242.0 55.8% 55.8%
3 hours	37 38.5 27.0% 8.5%	85 83.5 28.6% 19.6%	122 122.0 28.1% 28.1%
4 hours	16 13.9 11.7% 3.7%	28 30.1 9.4% 6.5%	44 44.0 10.1% 10.1%
5 hours or more	4 8.2 2.9% 0.9%	22 17.8 7.4% 5.1%	26 26.0 6.0% 6.0%
Total	137 137.0 100% 31.6%	297 297.0 100% 68.4%	434 434.0 100% 100%

Table 12 (a): Cross tabulation of the availability of study desk in rooms and type of hostel.

Study desk	Type of hostel		Total
	Old hostel	New hostel	
Yes	132 132.0 97.1% 30.7%	288 287.2 98.0% 67.0%	420 420.0 97.7% 97.7%
No	4 3.2 2.9% 0.9%	6 6.8 2.0% 1.4%	10 10.0 2.3% 2.3%
Total	136 136.0 100% 31.6%	294 294.0 100% 68.4%	430 430.0 100% 100%

Table 12 (b): Cross tabulation of the availability of study chair in rooms and type of hostel.

Study chair	Type of hostel		Total
	Old hostel	New hostel	
Yes	133 131.9 97.8% 30.9%	284 285.1 96.6% 66.0%	417 417.0 97.0% 97.0%

No	3 4.1 2.2% 0.7%	10 8.9 3.4% 2.3%	13 13.0 3.0% 3.0%
Total	136 136.0 100% 31.6%	294 294.0 100% 68.4%	430 430.0 100% 100%

Table 12 (c): Cross tabulation of the availability of study lamp in rooms and type of hostel.

Study lamp	Type of hostel		Total
	Old hostel	New hostel	
Yes	120 117.7 88.2% 27.9%	252 254.3 85.7% 58.6%	372 372.0 86.2% 86.2%
No	16 18.3 11.8% 3.7%	42 39.7 14.3% 9.8%	58 58.0 13.5% 13.5%
Total	136 136.0 100% 31.6%	294 294.0 100% 68.4%	430 430.0 100% 100%

Table 13: Classification of student responses by the type of hostel and sufficient water supply in blocks.

Sufficient water supply	Type of hostel		Total
	Old hostel	New hostel	
Yes	117 115.5 85.4% 27.0%	248 249.5 83.8% 57.3%	365 365.0 84.3% 84.3%
No	20 21.5 14.6% 4.6%	48 46.5 16.2% 11.1%	68 86.0 15.7% 15.7%
Total	137 137.0 100% 31.6%	296 296.0 100% 68.4%	433 433.0 100% 100%

Table 14: Cross tabulation of safety in rooms and type of hostel

Safety in room	Type of hostel		Total
	Old hostel	New hostel	
Yes	104 108.1 75.9% 24.1%	237 232.9 80.3% 54.9%	341 341.0 78.9% 78.9%
No	33 28.9	58 62.1	91 91.0

	24.1% 7.6%	19.7% 13.4%	21.1% 21.1%
Total	137 137.0 100% 31.7%	295 295.0 100% 68.3%	433 433.0 100% 100%

Table 15: Cross tabulation of effectiveness of UNAM security personnel and type of hostel.

Effectiveness of UNAM security personnel	Type of hostel		Total
	Old hostel	New hostel	
Highly effective	15 12.8 13.5% 4.5%	23 25.2 10.5% 7.0%	38 38.0 11.5% 11.5%
Moderate	64 62.9 57.7% 19.4%	123 124.1 56.2% 37.3%	187 187.0 56.7% 56.7%
Ineffective	32 35.3 28.8% 9.7%	73 69.7 33.3% 22.1%	105 105.0 31.8% 31.8%
Total	111 111.0 100% 33.6%	219 219.0 100% 66.4%	330 330.0 100% 100%

Table 16: Cross tabulation of the status of security on campus and type of hostel.

Should security on campus remain unchanged?	Type of hostel		Total
	Old hostel	New hostel	
Yes	45 51.2 33.3% 10.5%	118 111.8 40.0% 27.4%	163 163.0 37.9% 37.9%
No	90 83.3 66.7% 20.9%	177 183.2 60.0% 41.2%	267 267.0 62.1% 62.1%
Total	135 135.0 100% 31.4%	295 295.0 100% 68.6%	430 430.0 100% 100%

4.1.1. Determining whether the responses from the two hostels differ significantly

In order to determine whether the perceptions of students from the two hostels differ significantly, a Fisher exact test in section 3.2.3 was used. The hypotheses to be tested are:

1. Ho: There is no difference in the perceptions of students from the two hostels
2. Ha: The perceptions of students from the two hostels differ significantly
3. $\alpha = 0.1$

The hypotheses are tested at the 0.1 level of significance because we are trying to include as wide a range of variables as possible that might be analyzed in detail in further studies.

Test statistics:

By considering the table's total margins to be fixed and assuming that the data are hypergeometrically distributed we calculate the Fisher exact test in section 3.2.3 and the two sided exact test probabilities are presented in Table 17 below.

Table 17: Fisher's Exact Test

Variable name	$Pr \leq p$
Age category of the respondents	0.8816
Current year of study	0.1439
Financial assistance	0.2379
Time spend in the hostel	0.4946
Type of room occupied	0.3066
The number of times the respondents changed blocks	0.1375
Ability to study in the room during the day	1.00
Ability to study in the room at night	0.6162
Time spend on study everyday	0.2611
Is your room equipped with study desk	0.7318
Is your room equipped with study chair	0.7628
Is your room equipped with study lamp	0.5452
Is there adequate water supply	0.7766
Do you feel safe in your room	0.3116
Effectiveness of UNAM security personnel	0.5766
Security on campus should remain as it is today	0.1999

In the case where Fisher exact test cannot be computed the Monte Carlo estimate for the Fisher Exact Test was computed. In our case we compute the Monte Carlo Estimate for

the Fisher's Exact Test for the Table of field of study and GPA by type of hostel. The results are presented below:

1. Field of study by type of hostel

Pr ≤ P	0.6254
99% Lower Conf Limit	0.6215
99% Upper Conf Limit	0.6294

2. GPA by type of hostel

Pr ≤ P	0.7926
99% Lower Conf Limit	0.7892
99% Upper Conf Limit	0.7959

Conclusion: For all tables, the exact p-value > 0.1. Thus we do not have sufficient evidence to reject the null hypotheses at the 0.1 significance level. The perceptions of students from the two hostels statistically are the same.

4.2. Test for association

The Cochran Mantel-Haenszel (CMH) test based on the table scores, controlling for blocks as strata was conducted in order to establish whether there is significant association between the following living and study variables that we presume to be related:

1. Time spent in the hostel and Type of room
2. Ability to study in room during the day and Type of room
3. Ability to study in room at night and Type of room

4. Type of room and Safety in room
5. Time spent in hostel and Number of times respondents change blocks
6. Ability to study in room at night and study desk in rooms
7. Ability to study in room at night and study chair in rooms
8. Ability to study in room at night and study lamp in rooms
9. Effectiveness of UNAM security personnel and Safety studying at classes at night
10. Effectiveness of UNAM security personnel and Should security on campus remain unchanged?

We regard all these variables as ordinal or interval. Time spent in hostel and number of times students change blocks are interval variables. Type of room (single/double) is ordinal, because we consider it as referring to the number of students occupying the room. Ability to study in room during the day, ability to study in room at night, safety in room, availability of study desk, chair and lamp in rooms, safety studying at classes at night, effectiveness of UNAM security personnel and should campus security remain unchanged? are ordinal since we are considering their level that is yes/no to be ordered (i.e. yes is better than no).

The CMH test statistic (which is the test for nonzero correlation and general association) given in section 3.2.3 will be computed. The hypotheses to be tested are as follows:

1. Ho: There is no association between the living and study variables
2. Ha: There exist an association between the living and study variables
3. Significance level of the test is 0.1

The resulting test statistics and the p-values for the CMH test are presented in Table 18 below:

Table 18: Results of the CMH test controlling for block as strata

Variables	df	Test statistics	Prob
Time spent in hostel and Type of room	4	19.8142	0.0005
Ability to study in room during the day and Type of room	1	9.1116	0.0025
Ability to study in room at night and Type of room	1	3.3381	0.0677
Type of room and Safety in room	1	0.0913	0.7626
Time spent in hostel and Number of times respondents change blocks	12	65.9883	<0.0001
Ability to study in room at night and Availability of study desk in room	1	2.8507	0.0913
Ability to study in room at night and Availability of study chair in room	1	0.9857	0.3208
Ability to study in room at night and Availability of study lamp in room	1	4.1647	0.0413
Effectiveness of UNAM security personnel and Safety studying at classes at night	1	9.7287	0.0018
Effectiveness of UNAM security personnel and Should security on campus remain unchanged	1	68.8188	<0.0001

Conclusion:

The CMH test leads us to two different conclusions as follows:

1. At the 0.1 significance level the CMH test gives a p-value < 0.1 for time spent in hostel and type of room, ability to study in room during the day and type of room, ability to study in room at night and type of room, Time spent in hostel and Number of times respondents change blocks, ability to study in room at night and availability of study desk in rooms, ability to study in room at night and availability of study lamp in rooms, Effectiveness of UNAM security personnel and Safety studying at classes at night and Effectiveness of UNAM security personnel and Should security on campus remain unchanged?

.

Therefore, the null hypothesis is rejected in favor of the alternative hypotheses and hence we conclude that the above living and study variables are associated.

The individual Tables indicating the nature of association between the above variables within the strata is presented in Appendix II (i). The entries in the Tables are the proportion of students. From the Tables, there is no priorities in allocation bedding rooms to students while ability to study in room during the day and type of room are positively associated, also ability to study in room at night and type of room are positively associated except in stratum 13. There is a negative association between ability to study in room at night and number of times student change blocks, while ability to study in room at night and availability of both study desk and lamp in rooms are positively associated across all strata.

There is a positive association between ability to study in room at night and highly effectiveness of security personnel except in strata 5, 12 and 13 (where the association is negative), while ability to study in room at night and moderate effective of security personnel are negatively associated except in strata 1, 4, 12 and 13, and ability to study in room at night and ineffectiveness of security personnel are negatively associated except in strata 2, 5, 9 and 14 respectively. Similarly, should security on campus remain unchanged is positively associated with highly effectiveness of security personnel, with moderate effectiveness of security personnel except in strata 5, 10, 11, 12 and 14, while should security on campus remain unchanged is negatively associated with ineffectiveness of security personnel.

Table 19 (a) - (h) below present the significance of the test for association for the above variables across the strata and their corresponding adjusted p-values (Hochberg p-values denoted as hoc_p in tables) produced by the SAS Multtest procedure. The Multtest procedure approaches the multiple testing problems by adjusting the p-values from a family of hypotheses tests. The adjusted p-value is the smallest significance level for which the given hypotheses would be rejected when the entire family test is considered. The Hochberg method controls the family wise of error rate under the assumption of independence.

Table 19 (a): Time spent in hostel and Type of room

The Multtest Procedure

Test	Strata	Raw_P	hoc_p
1	Stratum1	0.0202	0.1818
2	Stratum2	0.6741	0.6741
3	Stratum3	0.1600	0.6741
4	Stratum5	0.0970	0.6741
5	Stratum7	0.1551	0.6741
6	Stratum8	0.6576	0.6741
7	Stratum10	0.3088	0.6741
8	Stratum11	0.4604	0.6741
9	Stratum14	0.1527	0.6741

(b) Ability to study in room during the day and Type of room

Test	Strata	Raw_P	hoc_p
1	Stratum1	0.4062	0.9813
2	Stratum2	0.9813	0.9813
3	Stratum3	0.4034	0.9813
4	Stratum4	0.4268	0.9813
5	Stratum5	0.2885	0.9813
6	Stratum6	0.0052	0.0676
7	Stratum7	0.0820	0.9813
8	Stratum8	0.1374	0.9813
9	Stratum10	0.1681	0.9813
10	Stratum11	0.5541	0.9813
11	Stratum12	0.4927	0.9813
12	Stratum13	0.9318	0.9813
13	Stratum14	0.2367	0.9813

(c) Ability to study in room at night and Type of room

Test	Strata	Raw_P	hoc_p
1	Stratum1	0.0849	0.6625
2	Stratum2	0.3393	0.6625
3	Stratum3	0.3723	0.6625
4	Stratum4	0.4902	0.6625
5	Stratum5	0.2008	0.6625
6	Stratum6	0.6015	0.6625
7	Stratum7	0.4720	0.6625
8	Stratum8	0.5282	0.6625
9	Stratum10	0.6095	0.6625
10	Stratum11	0.0614	0.6625
11	Stratum12	0.6171	0.6625
12	Stratum13	0.0033	0.0429
13	Stratum14	0.6625	0.6625

(d) Time spent in hostel and Number of times students change blocks

Test	Strata	Raw_P	hoc_p
1	Stratum2	0.6282	0.9788
2	Stratum3	0.0001	0.0006
3	Stratum5	0.0016	0.0080
4	Stratum7	0.5656	0.9788
5	Stratum8	0.0903	0.3612
6	Stratum11	0.9788	0.9788

(e) Ability to study in room at night and Availability of study desk in rooms

Test	Strata	Raw_P	hoc_p
1	Stratum1	0.0652	0.3260
2	Stratum3	0.5015	0.6171
3	Stratum5	0.3841	0.6171
4	Stratum6	0.0555	0.3260
5	Stratum10	0.6095	0.6171
6	Stratum11	0.0614	0.3260
7	Stratum12	0.6171	0.6171

(f) Ability to study in room at night and Availability of study lamp in rooms

Test	Strata	Raw_P	hoc_p
1	Stratum1	0.4264	0.6327
2	Stratum2	0.1780	0.6327
3	Stratum3	0.5015	0.6327
4	Stratum4	0.1869	0.6327
5	Stratum5	0.6015	0.6327
6	Stratum6	0.0228	0.2964
7	Stratum7	0.1956	0.6327
8	Stratum8	0.6327	0.6327
9	Stratum9	0.2758	0.6327
10	Stratum10	0.5748	0.6327
11	Stratum11	0.0007	0.0098
12	Stratum12	0.3657	0.6327
13	Stratum13	0.5769	0.6327
14	Stratum14	0.3507	0.6327

(g) Effectiveness of UNAM security personnel and Safety studying at classes at night

Test	Strata	Raw_P	hoc_p
1	Stratum1	0.1841	0.8918
2	Stratum2	0.5724	0.8918
3	Stratum3	0.3953	0.8918
4	Stratum4	0.2004	0.8918
5	Stratum5	0.4028	0.8918
6	Stratum6	0.0367	0.4771
7	Stratum7	0.2513	0.8918
8	Stratum8	0.3277	0.8918
9	Stratum9	0.7602	0.8918
10	Stratum10	0.2526	0.8918
11	Stratum11	0.1387	0.8918
12	Stratum12	0.8918	0.8918
13	Stratum14	0.5609	0.8918

(h) Effectiveness of UNAM security personnel and Should security on campus remain unchanged?

Test	Strata	Raw_P	hoc_p
1	Stratum1	0.0166	0.1304
2	Stratum2	0.0757	0.2271
3	Stratum3	0.0022	0.0264
4	Stratum4	0.0295	0.1304
5	Stratum5	0.4450	0.4450
6	Stratum6	0.3291	0.4450
7	Stratum7	0.0011	0.0143
8	Stratum8	0.0150	0.1304
9	Stratum9	0.0326	0.1304
10	Stratum10	0.0190	0.1304
11	Stratum11	0.0043	0.0473
12	Stratum12	0.0287	0.1304
13	Stratum14	0.0048	0.0480

The Hochberg p-value results in Table 19 indicate that given that we have done at most 14 test in any of the variables in part a, b, c, d, e and f above, the association between time spent in the hostel and type of room, ability to study in room at night and availability of study desk in rooms and effectiveness of UNAM security personnel and safety studying at classes at night is not significant in both strata in part a, e and g respectively. In particular ability to study in room during the day and type of room is only significant in strata 6, ability to study in room at night and type of room is significant in strata 13,

time spent in hostel and number of times students change blocks is significant in strata 3 and 5, ability to study in room at night and availability of study lamp in rooms is only significant in stratum 11 and effectiveness of UNAM security personnel and should security on campus remain unchanged is significant in strata 3, 7, 11 and 14.

2. Similarly at the 0.1 significance level the CMH test gives a p-value > 0.1 for Type of room and Safety in room, Ability to study in room at night and study chair in rooms.

Therefore, we do not have sufficient evidence to reject the null hypothesis and hence we conclude that the above living and study variables are not associated.

The individual Tables indicating the nature of association between the above variables within the strata are presented in Appendix II (ii). From the Tables, Safety in room and type of room are positively associated and also ability to study in room at night and availability of study chair in room are positively associated except in strata 11.

The corresponding Hochberg p-values are:

(i) Type of room and Safety in room

Test	Strata	Raw_P	hoc_p
1	Stratum1	0.2623	0.8766
2	Stratum2	0.4244	0.8766
3	Stratum3	0.8766	0.8766
4	Stratum4	0.5553	0.8766
5	Stratum5	0.0068	0.0884
6	Stratum6	0.4579	0.8766
7	Stratum7	0.7227	0.8766
8	Stratum8	0.4373	0.8766
9	Stratum10	0.7855	0.8766
10	Stratum11	0.7773	0.8766
11	Stratum12	0.6080	0.8766
12	Stratum13	0.5997	0.8766
13	Stratum14	0.6080	0.8766

(j) Ability to study in room at night and Availability of study chair in rooms

Test	Strata	Raw_P	hoc_p
1	Stratum2	0.3506	0.7055
2	Stratum3	0.7055	0.7055
3	Stratum5	0.3841	0.7055
4	Stratum6	0.3156	0.7055
5	Stratum8	0.4317	0.7055
6	Stratum11	0.0614	0.4912
7	Stratum12	0.6171	0.7055
8	Stratum13	0.6171	0.7055

The Hochberg p-value results in Table 19 (i) and (j) indicates that type of room and safety in room and ability to study in room at night and availability of study chair in rooms are not significant across the strata.

4.3. Students' opinions on whether the library provides sufficient study materials in helping them in their studies

The library as a means of information acquisition plays an important role in education. The type of facility a library has is a pointer to the type of knowledge that the student is most likely to acquire. The students were requested to indicate whether the library provides sufficient study materials to help them in their academic work. 180 out of 434 students representing 41.5 percent reported that the library provides them with sufficient study materials in helping them in their studies, the corresponding 90% confidence interval (CI) is [37.5%; 45.5%], while 254 out 434 students representing 58.5 percent reported that the library does not provides them with sufficient study materials, the reasons given were: the books in the library are not sufficient, inadequate computer and internet facilities and the librarians are not helpful in assisting students with relevant study materials

4.4. Students' opinions on the safety of the campus residence

The following living and study variables measured student opinions on the safeness of the campus residence: safety in rooms, safety studying at classes at night and the effectiveness of UNAM security personnel.

341 out of 432 students representing 78.9 percent reported that they feel safe in their rooms, the corresponding 90% CI is [75.7%, 82.1%], while 91 out of 432 students representing 21.1 percent reported that they do not feel safe in their rooms The reasons given was lack of security personnel on campus, lack of fire safety materials such as extinguisher and poor quality door and locks.

On the safety studying at classes at night, 219 out 433 students representing 50.6 percent reported that they feel safe studying at classes at night, the corresponding 90% CI is [46.6%, 54.6%], while 214 out of 433 students representing 49.4 percent reported that they do not feel safe studying at classes at night. The reasons given were: lack of security personnel on campus and insufficient lighting around the campus.

The UNAM security personnel form an integral part of the security system overseeing the safety of students on campus. The student respondents where requested to rate the effectiveness of UNAM security personnel on campus. A 3 point scale, such as Highly effective = 0, Moderate = 1 and Ineffective = 2 was adopted to grade the performances of the security personnel in maintaining high level of safety on campus. 38 out of 330 students representing 11.5 percent reported that the security personnel are highly effective, the corresponding 90% CI is [8.6%, 14.4%], 187 out of 330 students representing 56.7 percent reported that the security personnel are moderately effective, the 90% CI is [55.2%, 61.2%], while 105 out 330 students representing 31.8 percent reported that the security personnel are ineffective, with 90% CI of [27.5%, 36.1%].

4.5. Individual correlations between GPA and living and study variables

In order to assess the strength of the relationship between GPA and the environment and study variables time spent in the hostel, number of times students change blocks, current year of study, time spent on study, a set of scatter plots were plotted (Figure 1, Appendix III). These plots indicates that the mean GPA differs across all levels of time spent in hostel, number of times students change blocks, current year of study and time spent on study respectively. In particular these plots exhibit outliers for students who spent less than a year, one year, two and three years in the hostel, students who do not change blocks and for those who change blocks only once, students who are in second and third year of study and students who spent two and three hours on their studies. Furthermore, the plots indicate no linear association between time spent in hostel, number of times students change blocks, current year of study, time spent on study and GPA, and the variation in GPA is not constant across levels of time spent in hostel, number of times students change blocks, current year of study and time spent on study.

For the following living and study variables:
Living variables

1. Type of room
2. Ability to study in room during the day
3. Ability to study in room at night
4. Do you get meals from the campus dinning hall
5. Do you get meals from the campus cafeteria
6. Self catering
7. Students satisfaction with the level of services provided by the catering departments
8. Sufficient water supply in hostels
9. Safety in rooms
10. Effectiveness of UNAM security personnel
11. Should security on campus remain unchanged

Study variables

1. Field of study
2. Financial assistance
3. Availability of study desk in room
4. Availability of study chair in room
5. Availability of study lamp in room
6. Sufficient study rooms
7. Library facilities
8. Safety studying at classes at night

a SAS (surveyreg) procedure that takes into consideration stratification of the variables will be used to calculate the T-test statistics to test whether the GPA differs with each living and study variable above. The hypotheses tested at the 0.1 significant levels are:

1. Ho: GPA does not differ with each variable
2. Ha: GPA differs with each variable

The T-test statistics and the corresponding p-values are presented in Table 20 (a) and (b). In the Table effectiveness of UNAM security personnel and financial assistance are each measured at 3 levels while the rest of the variables are measured at two levels. Field of study has 9 levels, thus a one-way ANOVA will be used to compute the F test statistics.

Table 20 (a): Living variables

Variable	t-value	Pr > | t |
Type of room	-1.87	0.0618
Ability to study in room during the day	-1.76	0.0795
Ability to study in room at night	-0.88	0.3810
Do you get meals from the campus dinning hall	0.32	0.7466
Do you get meals from the campus cafeteria	1.10	0.2712
Self catering	3.15	0.0020
Students satisfaction with the level of services	-0.14	0.8881

provided by the catering departments		
Sufficient water supply in hostels	-2.33	0.0201
Safety in rooms	-1.57	0.1166
Should security on campus remain unchanged	-0.96	0.3391

(b) Study variables

Variable	t-value	Pr > | t |
Availability of study desk in room	-0.33	0.7452
Availability of study chair in room	-0.95	0.3434
Availability of study lamp in room	0.41	0.6851
Sufficient study rooms	-1.39	0.1640
Library facilities	0.46	0.6477
Safety studying at classes at night	0.42	0.6765

Since Field of study, effectiveness of security personnel and financial assistance have more than two levels, which is too many to analyze with a t-test, a 1-way ANOVA and its F test will be done. The results are as follows:

(a) Field of study

```
1 – way ANOVA for Dependent Variable GPA

                        Sum of      Mean
Source             DF   Squares     Square    F Value   Pr > F

Model              9    1555.61     172.8456   1.50     0.1446
Error              410  47163.24    115.0323
Corrected Total    419  48718.85
```

(b) Effectiveness of security personnel

1 – way ANOVA for Dependent Variable GPA

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	180.83	90.4150	0.83	0.4388
Error	317	34702.66	109.4721		
Corrected Total	319	34883.49			

(c) Financial assistance

1 – way ANOVA for Dependent Variable GPA

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	1837.75	918.8747	8.04	0.0004
Error	417	47656.50	114.2842		
Corrected Total	419	49494.25			

Tests of Model Effects

Effect	Num DF	F Value	Pr > F
Model	2	7.92	0.0004
Intercept	1	11518.20	<.0001
Scholarships	1	1.79	0.1814
Loans	1	15.11	0.0001

Conclusion:

For the living variables, type of room, ability to study in room during the day, self-catering, sufficient water supply in blocks and financial assistance in the form of loans provided p-values < 0.1, therefore we reject the null hypotheses and concludes that the GPA differs with type of room, ability to study in room during the day, self-catering, sufficient water supply in blocks and financial assistance in the form of loans.

For the study variables, the field of study such as Law and B.Commerce and financial assistance such as Loan provided p-values < 0.1, therefore we reject the null hypotheses and concludes that the GPA differs with Law and B.Commerce field of study and Loans.

4.6. Regression Model

In order to determine the relationships between the living and study variables thought to affect student GPA, a first order regression model will be considered. The predictor variables are:

1. Field of study
2. Financial assistance
3. Type of room
4. Ability to study in room during the day
5. Ability to study in room at night
6. Time spent on study
7. Do you get meals from the campus cafeteria
8. Self catering
9. Sufficient water supply in the hostels
10. Availability of study desk in room
11. Availability of study chair in room
12. Availability of study lamp in room
13. Sufficient study rooms
14. Library facilities
15. Safety in room
16. Safety studying at classes at night
17. Should security on campus remain unchanged?

A SAS procedure (surveyreg) for performing regression analysis for sample survey data taking stratification into consideration will be used to construct the regression model.

The first order regression model that we intend fitting is of the form:

$$Yi = \beta o + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \beta 6X6 + \beta 7X7 + \beta 8X8 + \beta 9X9 + \beta 10X10 + \beta 11X11 + \beta 12X12 + \beta 13X13 + \beta 14X14 + \beta 15X15 + \beta 16X16$$

$$+ \beta 17X17 + \beta 18X18 + \beta 19X19 + \beta 20X20 + \beta 21X21 + \beta 22X22 + \beta 23X23$$
$$+ \beta 24X24 + \beta 25X25 + \beta 26X26 + \varepsilon i$$

where;

Yi = students GPA

X1 = Time spent on study

X2 = Field of study (X2 = 1 if B.Science, -1 if Comprehensive Nursing)

X3 = Field of study (X3 = 1 if B.Economics, -1 if Comprehensive Nursing)

X4 = Field of study (X4 = 1 if B.Education, -1 if Comprehensive Nursing)

X5 = Field of study (X5 = 1 if Law, -1 if Comprehensive Nursing)

X6 = Field of study (X6 = 1 if B.Commerce, -1 if Comprehensive Nursing)

X7 = Field of study (X7 = 1 if B.B.Administration, -1 if Comprehensive Nursing)

X8 = Field of study (X8 = 1 if B.Accounting, -1 if Comprehensive Nursing)

X9 = Field of study (X2 = 1 if B.Art, -1 if Comprehensive Nursing)

X10 = Field of study (X2 = 1 if Information Studies, -1 if Comprehensive Nursing)

X11 = Financial assistance (X11 = 1 if Scholarship, –1 if sponsored by parents)

X12 = Financial assistance (X12 = 1 if loan, –1 if sponsored by parents)

X13 = Type of room (X13 = 1 if single room, -1 if double room)

X14 = Ability to study in room during the day (X14 = 1 if yes, -1 if no)

X15 = Ability to study in room at night (X15 = 1 if yes, -1 if no)

X16 = Do you get meals from the campus cafeteria (X16 = 1 if yes, -1 if no)

X17 = Self catering (X17 = 1 if yes, -1 if no)

X18 = Sufficient water supply in the hostels (X18 = 1 if yes, -1 if no)

X19 = Availability of study desk in room (X19 = 1 if yes, -1 if no)

X20 = Availability of study chair in room (X20 = 1 if yes, -1 if no)

X21 = Availability of study lamp in room (X21 = 1 if yes, -1 if no)

X22 = Sufficient study rooms (X22 = 1 if yes, -1 if no)

X23 = Library facilities (X23 = 1 if yes, -1 if no)

X24 = Safety in room (X24 = 1 if yes, -1 if no)

X25 = Safety studying at classes at night (X25 = 1 if yes, -1 if no)

X26 = Should security on campus remain unchanged (X26 = 1 if yes, -1 if no)

And;

βo, β1, β2, β3, β4, β5, β6, β7, β8, β9, β10, β11, β12, β13, β14, β15, β16, β17, β18, β19, β20, β21, β22, β23, β24, β25, β26 are the parameters of the model

4.6.1. Model selection

We begin our model selection process by first considering the results of the model fit with the two SAS procedures, proc reg and proc surveyreg which take into consideration the stratification aspect of the data. If the results were the same then we would prefer to build our model using proc reg and imply the resulting results to the proc surveyreg.

The SAS output for proc reg and proc surveyreg are presented in Figure 2 and 3 respectively.

Figure 2: The REG Procedure

Regression Analysis for Dependent Variable GPA (full model)

ANOVA Table

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	26	4529.65432	174.21747	1.70	0.0286
Error	124	12693	102.36457		
Corrected Total	150	17223			

Root MSE	10.11754	R-Square	0.2630
Dependent Mean	67.16556	Adj R-Sq	0.1085
Coeff Var	15.06358		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	61.81860	4.99671	12.37	<.0001
X1	1	0.80461	0.97032	0.83	0.4086
X2	1	-3.36706	2.48767	-1.35	0.1784

X3	1	-0.45366	3.36322	-0.13	0.8929
X4	1	-3.09004	2.30109	-1.34	0.1818
X5	1	15.76941	5.89979	2.67	0.0085
X6	1	0.37030	9.36738	0.04	0.9685
X7	1	-4.93921	3.74354	-1.32	0.1895
X8	1	-3.31560	2.23922	-1.48	0.1412
X9	1	-0.38832	3.40140	-0.11	0.9093
X10	1	-6.07683	4.76826	-1.27	0.2049
X11	1	2.59597	2.69722	0.96	0.3377
X12	1	-2.67404	1.62499	-1.65	0.1024
X13	1	-3.86469	1.81461	-2.13	0.0352
X14	1	-2.37385	1.03091	-2.30	0.0230
X15	1	1.76987	1.22947	1.44	0.1525
X16	1	-0.09601	1.24984	-0.08	0.9389
X17	1	4.36904	1.90936	2.29	0.0238
X18	1	-0.04601	1.19811	-0.04	0.9694
X19	1	3.64741	6.42689	0.57	0.5714
X20	1	1.89787	5.67579	0.33	0.7387
X21	1	1.36000	1.49634	0.91	0.3652
X22	1	1.03577	0.91831	1.13	0.2615
X23	1	-0.75677	1.00043	-0.76	0.4508
X24	1	-1.63981	1.18479	-1.38	0.1688
X25	1	-0.86807	1.01131	-0.86	0.3923
X26	1	0.00056	1.08633	0.00	0.9996

Figure 3: The SURVEYREG Procedure

Regression Analysis for Dependent Variable GPA (full model)

ANOVA Table

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	26	4529.65	174.2175	1.70	0.0286
Error	124	12693.21	102.3646		
Corrected Total	150	17222.86			

R-square 0.2630
Root MSE 10.1175

Estimated Regression Coefficients

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	61.8186007	4.61194885	13.40	<.0001
X1	0.8046088	0.96727419	0.83	0.4070
X2	-3.3670611	2.30141026	-1.46	0.1457
X3	-0.4536559	3.02849059	-0.15	0.8811
X4	-3.0900392	1.86809783	-1.65	0.1004
X5	15.7694086	8.41513354	1.87	0.0631
X6	0.3703041	1.89979478	0.19	0.8457

X7	-4.9392140	4.04977311	-1.22	0.2247
X8	-3.3155973	2.08680486	-1.59	0.1144
X9	-0.3883182	2.73407880	-0.14	0.8873
X10	-6.0768337	3.94939645	-1.54	0.1262
X11	2.5959687	3.43141838	0.76	0.4506
X12	-2.6740375	2.03402106	-1.31	0.1908
X13	-3.8646927	1.90407959	-2.03	0.0443
X14	-2.3738467	1.15871435	-2.05	0.0424
X15	1.7698710	1.22993466	1.44	0.1524
X16	-0.0960149	1.63977717	-0.06	0.9534
X17	4.3690394	1.56166507	2.80	0.0059
X18	-0.0460079	1.29846957	-0.04	0.9718
X19	3.6474101	3.27404422	1.11	0.2672
X20	1.8978747	2.81677051	0.67	0.5016
X21	1.3600027	1.41536327	0.96	0.3383
X22	1.0357724	0.94303432	1.10	0.2740
X23	-0.7567698	1.04396859	-0.72	0.4698
X24	-1.6398076	1.24252549	-1.32	0.1891
X25	-0.8680722	0.93742562	-0.93	0.3561
X26	0.0005575	1.09035301	0.00	0.9996

The test statistics (F) for regression coefficients was computed using the Extra Sums of Squares and the results are presented in Table 21.

Table 21: Test statistics for regression coefficients using Extra Sums of Squares

Variable removed from the model	Df	F distribution (proc reg)	F distribution (proc surveyreg)
Time spent on study	1	0.6936	0.6875
Field of study	9	1.3601	1.3599
Financial assistance	3	1.2244	1.2246
Type of room	1	4.5427	4.5360
Ability to study in room during the day	2	2.7110	2.7071
Ability to study in room at night	2	1.1186	1.1174
Do you get meals from the campus cafeteria	8	0.5983	0.5985
Self catering	1	1.0886	1.0886
Sufficient water supply in the hostels	2	0.0537	0.0528
Availability of study desk in room	1	0.3223	0.3220
Availability of study chair in room	1	0.1172	0.1117

Availability of study lamp in room	1	0.8304	0.8261
Sufficient study rooms	1	1.2700	1.2721
Library facilities	1	0.5763	0.5721
Safety in room	2	1.1576	1.1557
Safety studying at classes at night	1	0.7424	0.7368
Should security on campus remain unchanged	1	0	0

Comparison of the two ANOVA tables in Figures 2 and 3 and the resulting test statistics for the regression coefficients in Table 21, indicates that the two procedures provide similar results. The model fitted in Figure 1 is highly significant at the 0.1 level with R-square and adjusted R-square of 0.2630 and 0.1085 respectively. The residual plot against fitted values in Figure 4 (Appendix III) indicate no ground for suspecting lack of fit of the regression function or the constancy of the error variance, while the normal QQ-plot indicates no serious divergence from normality. A test for multicollinearlity in Table 22 indicates that there is no multicollinearity in the data. Even though the model is highly significant, most of the variables are not significant. Thus variable selection is needed to determine those variables that are significant in the model.

Table 22: Test for Multicollinearity

Variable in the model	Variance Inflation Factor
X1	1.2865
X2	1.7032
X3	1.6948
X4	1.7553
X5	2.0402
X6	3.4061
X7	1.4833
X8	1.6109

X9	1.4326
X10	1.7710
X11	3.3003
X12	3.2694
X13	1.5287
X14	1.5479
X15	1.4552
X16	1.5394
X17	1.8095
X18	1.2437
X19	4.7459
X20	4.9019
X21	1.5181
X22	1.2373
X23	1.3567
X24	1.5867
X25	1.4795
X26	1.6247

The backward elimination method using proc surveyreg was found to give good variable selection results for this data. The results are presented in Figure 5 below. All the variables left in the model are significant at the 0.1 levels.

Figure 5: Result of the Backward Elimination Method

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	2674.48	668.6197	6.83	<.0001
Error	157	15378.66	97.9533		
Corrected Total	161	18053.14			

```
Fit Statistics

R-square            0.1481
Root MSE            9.8971
Denominator DF      148


Estimated Regression Coefficients

                            Standard
Parameter       Estimate    Error          t Value    Pr > |t|

Intercept     66.2307312    1.93250994     34.27      <.0001
X5             8.0768881    4.72949103      1.71      0.0898
X13           -3.1522685    1.87142280     -1.68      0.0942
X14           -1.9517704    0.90641247     -2.15      0.0329
X17            4.4137754    0.97570161      4.52      <.0001
```

4.6.2. Model Validation

To further explore the validity of the model obtained by the backward variable elimination method, we consider the model fitted in Figures 5 section 5.4.1. The variance inflation factor (VIF) results in Table 23 indicate no multicollinearity among the variables left in the model, while the residual plots against fitted values in Figure 6 (Appendix III) indicate no ground for suspecting lack of fit of the regression function or the constancy of the error variance and the QQ-plot indicates no serious divergence from normality.

Table 23: Test for Multicollinearity

Variable in the model	Variance Inflation Factor
X5	1.1430
X13	1.0976
X14	1.1389
X17	1.1313

4.6.3. Interpretations of the fitted model

The estimated mean GPA when all predictors in the model are set to zero, is 66.2307. The estimated mean GPA for all the students enrolled in law field of study is 8.0768 higher compared to the estimated mean GPA of all students enrolled in comprehensive nursing field of study, keeping all other predictors in the model constant.

The estimated mean GPA of all the students occupying double rooms is 3.1522 lower compared to the estimated mean GPA of all the students occupying single rooms, keeping all other predictors in the model constant. Similarly the estimated mean GPA of students who are not able to study in their rooms during the day is 1.9517 lower compared to the estimated mean GPA of students who are able to study in their rooms during the day, keeping all other predictors in the model constant. Finally the estimated mean GPA for all the students who are self catering is 4.4137 higher compared to the estimated mean GPA of all students who are receiving their meals either from the campus dinning hall or campus cafeteria, keeping all other predictors in the model constant.

5. CONCLUSIONS

This study has sought to obtain student perceptions of the living and study environments at the University of Namibia campus residence, and to relate these to student GPA. In reaching conclusions, we relied mainly on information provided in interviews conducted with a stratified random sample of students, and GPA data furnished by the University Registrar.

Statistically, student perceptions do not differ between old and new hostels. However, we have established an overall association between the time students spent in the hostels and the type of room the students occupied. Similarly, there is an association between the students' perceptions of their ability to study in their rooms during the day and the type of room, students' perceptions of their ability to study in their rooms at night and the type of room, the time the student spent in hostel and the number of times the student changed blocks, students' perceptions of their ability to study in their rooms at night and the availability of study desk in the rooms, students' perceptions of their ability to study in their rooms at night and the availability of study lamp in rooms, students' perceptions of the effectiveness of UNAM security personnel and students' perceptions of their safety studying at classes at night and also students' perceptions of the effectiveness of UNAM security personnel and the student opinions on whether the security on campus should remain unchanged, respectively. Although there is no overall association between type of room and student perceptions of safety in their room, and student perceptions of ability to study in room at night and study chair in room, within some strata these variables are associated.

On the library facilities, 58.5 percent of the students reported that the library does not provide them with sufficient study materials. In particular these students have highlighted insufficiency of books pertaining to their courses, inadequate computer and internet facilities and the lack of assistance from the librarians as their main reasons. The percentage of students who reported that they feel safe in their rooms is 78.9 percent and those who have reported that they feel safe studying at classes at night is 50.6 percent.

The reasons given by the students who feel unsafe in their rooms or studying at classes at night was the lack of security personnel and insufficient lighting around the campus, lack of fire safety materials such as extinguisher and poor quality doors and locks. On the effectiveness of security personnel in maintaining high level of safety on campus, only 11.5 percent of the students reported that the UNAM security personnel are highly effective in executing their duties, while 56.8 percent reported that the UNAM security personnel are moderately effective, and the percentage of the students who reported that the UNAM security personnel are ineffective in maintaining high level of safety on campus is 31.8 percent.

We have also established that the mean GPA differs with respect to the time students spent in hostel, number of times students change blocks, students' current year of study, time spent on study, type of room a student occupies, the students' reported ability to study in their rooms during the day, students who are self catering, student perception of sufficiency of water supply in blocks, students enrolled in Law and B.Commerce field of study and with students receiving financial support in the form of loans.

The regression model presented in Figure 5 was found to explain the relationship between student GPA and students enrolled in law field of study, students occupying double rooms, students who are not able to study in their rooms during the day and students who are self catering. The total variation in student GPA is reduced by 14.81 percent when the students enrolled in law field of study, students occupying double rooms, students who are not able to study in their rooms during the day and students who are self catering are considered. The interpretation given to this model is that, the estimated mean GPA when all predictors in the model are set to zero, is 66.2307. The estimated mean GPA for all the students enrolled in law field of study is 8.0768 higher compared to the estimated mean GPA of all students enrolled in comprehensive nursing field of study, keeping all other predictors in the model constant.

The estimated mean GPA of all the students occupying double rooms is 3.1522 lower compared to the estimated mean GPA of all the students occupying single rooms, keeping

all other predictors in the model constant. Similarly the estimated mean GPA of students who are not able to study in their rooms during the day is 1.9517 lower compared to the estimated mean GPA of students who are able to study in their rooms during the day, keeping all other predictors in the model constant. Finally the estimated mean GPA for all the students who are self catering is 4.4137 higher compared to the estimated mean GPA of all students who are receiving their meals either from the campus dinning hall or campus cafeteria, keeping all other predictors in the model constant.

Appendix I

A QUESTIONNAIRE ON

Resident Student Perceptions of On-Campus Living and Study Environments at the University of Namibia and their Relation to Academic Performance

This study is being conducted in conjunction with the Department of Statistics at the University of Namibia

For inquiries conduct:

Isak Neema

Department of Statistics

Office number: W254

Tel: 206 – 3495

Email: ineema@unam.na

The objective of this study is to obtain students perception on living and study variables thought to affect living and study environments of student at the University of Namibia campus residence. This questionnaire consists of two sections, namely, **SECTION 1**, addressing personal details of respondents and **SECTION 2**, which constitute questions on variables measuring the living and study environments of students on campus. The respondent is requested to attempt all questions.

SECTION 1

Please tick or cross in the corresponding box appropriate to your response.

1. Sex group?

Male	
Female	

2. To which age categories do you belong?

19 or less	
20 – 29	
30 and above	

3. To which religious affiliation do you belong?

Catholics	
Lutheran	
27 Adventist	
Muslim	
Jehovah Witness	
Other, specify	

5. Student number ----------

SECTION 2

Answer all the questions in this section, tick or cross in the box next to the item that applied to you.

4. What is your field of study? ----------

6. Your current year of study?

2nd year	
3rd year	
4th year	
5th year	
Others, specify	

7. Are you a holder of the following financial aid?

Scholarship	
Loan	
Other	

If other, please specify ----------

8. How long have you been in the hostel?

---

9. Which type of room are you occupying at the moment?

Single room	
Double room	

10. How many times did you change blocks?

None	
Once	
Twice	
More than twice (Specify)	

11. If you have changed blocks, what was the reason for your changes?

---

12. Is your room furnished with the following study equipment? Tick or cross all that apply.

Study desk	
Study Chair	
Study lamp	

13. Are you able to study in your room at any of these time frames?

(a) During the day

Yes	
No	

If No, why?

(b) At night

Yes	
No	

If No, why?

---

14. How many hours do you spend on your studies each day, after the normal lectures?

2 hours or less	
3 hours	
4 hours	
5 or more	

15. Do you get your meals from any of the following catering departments? Tick all that applies to you.

Campus Dinning hall	
Campus cafeteria	
Others	

If others, please specify ----------

16. If you get your meals from the campus dinning hall or cafeteria, is the food,

(a) Properly prepared?

Yes	
No	

(b) Is it adequate?

Yes	
No	

17. Are you satisfied with the level of services this two catering departments provides?

Yes	
No	

If No, why

---

18. Is there enough study rooms apart from students bedding room, available on campus that one can make use of?

Yes	
No	

19. If Yes, are this study rooms adequately well equipped in terms of study desk, chairs, light and noise free?

---

20. Does the Library provide you with adequate study materials and internet facilities to help you in your academic work?

Yes	
No	

If no, why?

---

21. Is there adequate water supply in your block?

Yes	
No	

22. Do you feel safe in your room?

Yes	
No	

If no, why?

---

23. Do you feel safe studying at classes at night?

Yes	
No	

If no, why?

---

24. How effective do you think UNAM Security personnel are?

Highly effective	
Moderate	
Completely ineffective	
Don't know	

25. Do you think security on campus needs considerable improvement? If yes, what kind of improvement is needed in order to guarantee tight safety on campus?

---

26. In your opinion, what should be done to improve learning environment on campus?

We recognize how busy you must be and greatly appreciate you taking time to complete this questionnaire.

THANK YOU!

Appendix II (i)

Nature of Association

1. Time spent in hostel and Type of room

Strata 1

Time (yrs)	0	1	2	3	4
Single room	0.50	0.8889	0.9375	0.8333	1
Double room	0.50	0.1111	0.0625	0.1667	0

Strata 2

Time (yrs)	0	1	2	3	4
Single room	1	0.8889	1	0.9167	1
Double room	0	0.1111	0	0.0833	0

Strata 3

Time (yrs)	0	1	2	3	4
Single room	0.8889	0.6250	0.9000	1	1
Double room	0.1111	0.3750	0.1000	0	0

Strata 4

Time (yrs)	0	1	2	3	4
Single room	1	0.8889	1	1	0
Double room	0	0.1111	0	0	0

Strata 5

Time (yrs)	0	1	2	3	4
Single room	0.70	0.9091	1	1	1
Double room	0.30	0.0909	0	0	0

Strata 6

Time (yrs)	0	1	2	3	4
Single room	0.40	0.8182	0.8750	0.75	0
Double room	0.60	0.1818	0.1250	0.25	0

Strata 7

Time (yrs)	0	1	2	3	4
Single room	0.75	0.60	0.8571	1	1
Double room	0.25	0.40	0.1429	0	0

Strata 8

Time (yrs)	0	1	2	3	4
Single room	1	0.8333	1	0.8571	1
Double room	0	0.1667	0	0.1429	0

Strata 9

Time (yrs)	0	1	2	3	4
Single room	1	1	1	1	1
Double room	0	0	0	0	0

Strata 10

Time (yrs)	0	1	2	3	4
Single room	1	0.8571	1	1	1
Double room	0	0.1429	0	0	0

Strata 11

Time (yrs)	0	1	2	3	4
Single room	1	0.8750	1	1	1
Double room	0	0.1250	0	0	0

Strata 12

Time (yrs)	0	1	2	3	4
Single room	0.75	1	1	1	1
Double room	0.25	0	0	0	0

Strata 13

Time (yrs)	0	1	2	3	4
Single room	0.60	0.80	1	1	0
Double room	0.40	0.20	0	0	0

Strata 14

Time (yrs)	0	1	2	3	4
Single room	1	1	1	0.75	1
Double room	0	0	0	0.25	0

2. Ability to study in room during the day and Type of room

Strata 1

Study in room	Single room	Double room
Yes	0.84	0.7368
No	0.16	0.2635

Strata 2

Study in room	Single room	Double room
Yes	0.9429	0.9444
No	0.0571	0.0556

Strata 3

Study in room	Single room	Double room
Yes	0.9130	0.8235
No	0.0870	0.1765

Strata 4

Study in room	Single room	Double room
Yes	0.9474	1
No	0.0526	0

Strata 5

Study in room	Single room	Double room
Yes	0.9048	0.75
No	0.0952	0.25

Strata 6

Study in room	Single room	Double room
Yes	1	0.5333
No	0	0.4667

Strata 7

Study in room	Single room	Double room
Yes	0.9333	0.6667
No	0.0667	0.3333

Strata 8

Study in room	Single room	Double room
Yes	1	0.8667
No	0	0.1333

Strata 9

Study in room	Single room	Double room
Yes	1	1
No	0	0

Strata 10

Study in room	Single room	Double room
Yes	1	0.90
No	0	0.10

Strata 11

Study in room	Single room	Double room
Yes	0.95	1
No	0.05	0

Strata 12

Study in room	Single room	Double room
Yes	0.9412	1
No	0.0588	0

Strata 13

Study in room	Single room	Double room
Yes	0.8333	0.8462
No	0.1667	0.1538

Strata 14

Study in room	Single room	Double room
Yes	1	0.90
No	0	0.10

3. Ability to study in room at night and Type of room

Strata 1

Study in room	Single room	Double room
Yes	0.8529	0.60
No	0.1471	0.40

Strata 2

Study in room	Single room	Double room
Yes	0.9268	1
No	0.0732	0

Strata 3

Study in room	Single room	Double room
Yes	0.8571	1
No	0.1429	0

Strata 4

Study in room	Single room	Double room
Yes	0.9524	1
No	0.0476	0

Strata 5

Study in room	Single room	Double room
Yes	0.9091	0.7145
No	0.0909	0.2857

Strata 6

Study in room	Single room	Double room
Yes	0.7727	0.6667
No	0.2273	0.3333

Strata 7

Study in room	Single room	Double room
Yes	0.8421	0.7143
No	0.1579	0.2857

Strata 8

Study in room	Single room	Double room
Yes	0.9231	1
No	0.0769	0

Strata 9

Study in room	Single room	Double room
Yes	1	1
No	0	0

Strata 10

Study in room	Single room	Double room
Yes	0.9565	1
No	0.0435	0

Strata 11

Study in room	Single room	Double room
Yes	1	0.8333
No	0	0.1667

Strata 12

Study in room	Single room	Double room
Yes	0.95	1
No	0.05	0

Strata 13

Study in room	Single room	Double room
Yes	0.95	0.40
No	0.05	0.60

Strata 14

Study in room	Single room	Double room
Yes	0.9524	1
No	0.0476	0

4. Time spent in hostel and Number of times student change blocks

Strata 1

# of times change blocks	Study in room at night	
	Yes	No
0	0.5588	0.70
1	0.4118	0.20
2	0	0
3	0.0294	0.10

Strata 2

# of times change blocks	Study in room at night	
	Yes	No
0	0.4634	0.4167
1	0.2683	0.50
2	0.2195	0
3	0.0488	0.0833

Strata 3

# of times change blocks	Study in room at night	
	Yes	No
0	0.7143	0.40
1	0.0571	0.40
2	0.1429	0.20
3	0.0857	0

Strata 4

# of times change blocks	Study in room at night	
	Yes	No
0	0.5238	0.60
1	0.3333	0.40
2	0.0476	0
3	0.0952	0

Strata 5

# of times change blocks	Study in room at night	
	Yes	No
0	0.50	0.4286
1	0.3636	0.2857
2	0.1364	0
3	0	0.2857

Strata 6

# of times change blocks	Study in room at night	
	Yes	No
0	0.4545	0.50
1	0.4545	0.1667
2	0.0909	0.1667
3	0	0.1667

Strata 7

# of times change blocks	Study in room at night	
	Yes	No
0	0.6842	0.5714
1	0.1579	0.2857
2	0.0526	0
3	0.1053	0.1429

Strata 8

# of times change blocks	Study in room at night	
	Yes	No
0	0.7692	0.60
1	0.1538	0.20
2	0.0385	0.20
3	0.0385	0

Strata 9

# of times change blocks	Study in room at night	
	Yes	No
0	0.8125	0.75
1	0.1875	0
2	0	0.25
3	0	0

Strata 10

# of times change blocks	Study in room at night	
	Yes	No
0	0.8261	1
1	0.0432	0
2	0.1304	0
3	0	0

Strata 11

# of times change blocks	Study in room at night	
	Yes	No
0	0.6667	0.8333
1	0.1905	0.1667
2	0.0952	0
3	0.0476	0

Strata 12

# of times change blocks	Study in room at night	
	Yes	No
0	0.65	0.80
1	0.20	0.20
2	0.10	0
3	0.05	0

Strata 13

# of times change blocks	Study in room at night	
	Yes	No
0	0.70	1
1	0.25	0
2	0.05	0
3	0	0

Strata 14

# of times change blocks	Study in room at night	
	Yes	No
0	0.6667	1
1	0.2381	0
2	0.0952	0
3	0	0

5. Ability to study in room during the night and Availability of study desk in room

Strata 1

Study in room at night	Study desk	
	Yes	No
Yes	1	0.90
No	0	0.10

Strata 2

Study in room at night	Study desk	
	Yes	No
Yes	1	1
No	0	0

Strata 3

Study in room at night	Study desk	
	Yes	No
Yes	0.9143	1
No	0.0857	0

Strata 4

Study in room at night	Study desk	
	Yes	No
Yes	1	1
No	0	0

Strata 5

Study in room at night	Study desk	
	Yes	No
Yes	09545	0.8571
No	0.0455	0.1429

Strata 6

Study in room at night	Study desk	
	Yes	No
Yes	1	0.8333
No	0	0.1667

Strata 7

Study in room at night	Study desk	
	Yes	No
Yes	1	1
No	0	0

Strata 8

Study in room at night	Study desk	
	Yes	No
Yes	1	1
No	0	0

Strata 9

Study in room at night	Study desk	
	Yes	No
Yes	1	1
No	0	0

Strata 10

Study in room at night	Study desk	
	Yes	No
Yes	0.9565	1
No	0.0435	0

Strata 11

Study in room at night	Study desk	
	Yes	No
Yes	1	0.8333
No	0	0.1667

Strata 12

Study in room at night	Study desk	
	Yes	No
Yes	0.95	1
No	0.05	0

Strata 13

Study in room at night	Study desk	
	Yes	No
Yes	1	1
No	0	0

Strata 14

Study in room at night	Study desk	
	Yes	No
Yes	1	1
No	0	0

6. Ability to study in room during the night and Availability of study lamp in room

Strata 1

Study in room at night	Study lamp	
	Yes	No
Yes	0.8182	0.70
No	0.1818	0.30

Strata 2

Study in room at night	Study lamp	
	Yes	No
Yes	0.9512	0.8333
No	0.0488	0.1667

Strata 3

Study in room at night	Study lamp	
	Yes	No
Yes	0.9143	1
No	0.0857	0

Strata 4

Study in room at night	Study lamp	
	Yes	No
Yes	0.9524	0.80
No	0.0476	0.20

Strata 5

Study in room at night	Study lamp	
	Yes	No
Yes	0.9091	0.8333
No	0.0909	0.1667

Strata 6

Study in room at night	Study lamp	
	Yes	No
Yes	0.9091	0.50
No	0.0909	0.50

Strata 7

Study in room at night	Study lamp	
	Yes	No
Yes	0.7895	1
No	0.2105	0

Strata 8

Study in room at night	Study lamp	
	Yes	No
Yes	0.6923	0.80
No	0.3077	0.20

Strata 9

Study in room at night	Study lamp	
	Yes	No
Yes	0.9375	0.75
No	0.0625	0.25

Strata 10

Study in room at night	Study lamp	
	Yes	No
Yes	0.9130	0.8333
No	0.0870	0.1667

Strata 11

Study in room at night	Study lamp	
	Yes	No
Yes	1	0.50
No	0	0.50

Strata 12

Study in room at night	Study lamp	
	Yes	No
Yes	0.85	1
No	0.1500	0

Strata 13

Study in room at night	Study lamp	
	Yes	No
Yes	0.8947	0.80
No	0.1053	0.20

Strata 14

Study in room at night	Study lamp	
	Yes	No
Yes	0.8095	1
No	0.1905	0

7. Effectiveness of UNAM security personnel and Safety studying at classes at night

Strata 1

UNAMSEC	Study at classes at night	
	Yes	No
Highly effective	0.2727	0.1154
Moderate	0.5455	0.5385
Ineffective	0.1818	0.3462

Strata 2

UNAMSEC	Study at classes at night	
	Yes	No
Highly effective	0.1765	0.0476
Moderate	0.6471	0.8995
Ineffective	0.1765	0.1429

Strata 3

UNAMSEC	Study at classes at night	
	Yes	No
Highly effective	0.1667	0
Moderate	0.4333	0.50
Ineffective	0.40	0.50

Strata 4

UNAMSEC	Study at classes at night	
	Yes	No
Highly effective	0.1667	0
Moderate	0.6667	0.6667
Ineffective	0.1667	0.3333

Strata 5

UNAMSEC	Study at classes at night	
	Yes	No
Highly effective	0	0.0667
Moderate	0.50	0.60
Ineffective	0.50	0.3333

Strata 6

UNAMSEC	Study at classes at night	
	Yes	No
Highly effective	0.40	0
Moderate	0.60	0.8182
Ineffective	0	0.1818

Strata 7

UNAMSEC	Study at classes at night	
	Yes	No
Highly effective	0.2143	0
Moderate	0.4286	0.50
Ineffective	0.3571	0.50

Strata 8

UNAMSEC	Study at classes at night	
	Yes	No
Highly effective	0.1667	0
Moderate	0.50	0.5556
Ineffective	0.3333	0.4444

Strata 9

UNAMSEC	Study at classes at night	
	Yes	No
Highly effective	0.1111	0
Moderate	0.4444	0.5714
Ineffective	0.4444	0.4286

Strata 10

UNAMSEC	Study at classes at night	
	Yes	No
Highly effective	0.2223	0
Moderate	0.4444	0.50
Ineffective	0.3333	0.50

Strata 11

UNAMSEC	Study at classes at night	
	Yes	No
Highly effective	0.3077	0
Moderate	0.5385	0.6667
Ineffective	0.1538	0.3333

Strata 12

UNAMSEC	Study at classes at night	
	Yes	No
Highly effective	0	0.1875
Moderate	0.8333	0.50
Ineffective	0.1667	0.3125

Strata 13

UNAMSEC	Study at classes at night	
	Yes	No
Highly effective	0	0
Moderate	0.8571	0.6154
Ineffective	0.1467	0.3846

Strata 14

UNAMSEC	Study at classes at night	
	Yes	No
Highly effective	0.2223	0
Moderate	0.3333	0.5714
Ineffective	0.4444	0.4286

8. Effectiveness of UNAM security personnel and Should security on campus remain unchanged?

Strata 1

UNAMSEC	Should security remain unchanged?	
	Yes	No
Highly effective	0.3636	0.0769
Moderate	0.5455	0.5385
Ineffective	0.0909	0.3846

Strata 2

UNAMSEC	Should security remain unchanged?	
	Yes	No
Highly effective	0.1667	0.0769
Moderate	0.8333	0.6923
Ineffective	0	0.2308

Strata 3

UNAMSEC	Should security remain unchanged?	
	Yes	No
Highly effective	0.30	0.0769
Moderate	0.70	0.3462
Ineffective	0	0.5769

Strata 4

UNAMSEC	Should security remain unchanged?	
	Yes	No
Highly effective	0.1667	0
Moderate	0.8333	0.60
Ineffective	0	0.40

Strata 5

UNAMSEC	Should security remain unchanged?	
	Yes	No
Highly effective	0.1111	0
Moderate	0.5556	0.5833
Ineffective	0.3333	0.4167

Strata 6

UNAMSEC	Should security remain unchanged?	
	Yes	No
Highly effective	0.1429	0.1111
Moderate	0.8571	0.6667
Ineffective	0	0.2222

Strata 7

UNAMSEC	Should security remain unchanged?	
	Yes	No
Highly effective	0.3750	0
Moderate	0.6250	0.3571
Ineffective	0	0.6429

Strata 8

UNAMSEC	Should security remain unchanged?	
	Yes	No
Highly effective	0.25	0
Moderate	0.6250	0.4286
Ineffective	0.1250	0.5714

Strata 9

UNAMSEC	Should security remain unchanged?	
	Yes	No
Highly effective	0.50	0
Moderate	0.50	0.50
Ineffective	0	0.50

Strata 10

UNAMSEC	Should security remain unchanged?	
	Yes	No
Highly effective	0.40	0
Moderate	0.40	0.50
Ineffective	0.20	0.50

Strata 11

UNAMSEC	Should security remain unchanged?	
	Yes	No
Highly effective	0.5714	0
Moderate	0.4286	0.6667
Ineffective	0	0.3333

Strata 12

UNAMSEC	Should security remain unchanged?	
	Yes	No
Highly effective	0.3333	0
Moderate	0.5556	0.6154
Ineffective	0.1111	0.3846

Strata 13

UNAMSEC	Should security remain unchanged?	
	Yes	No
Highly effective	0	0
Moderate	1	0.5714
Ineffective	0	0.4286

Strata 14

UNAMSEC	Should security remain unchanged?	
	Yes	No
Highly effective	1	0
Moderate	0	0.50
Ineffective	0	0.50

(ii)

1. Safety in room and Type of room

Strata 1

Safety in room	Single room	Double room
Yes	0.5714	0.7778
No	0.4286	0.2222

Strata 2

Safety in room	Single room	Double room
Yes	0.82	1
No	0.18	0

Strata 3

Safety in room	Single room	Double room
Yes	0.8286	0.80
No	0.1714	0.20

Strata 4

Safety in room	Single room	Double room
Yes	0.7333	1
No	0.2667	0

Strata 5

Safety in room	Single room	Double room
Yes	0.72	0
No	0.28	1

Strata 6

Safety in room	Single room	Double room
Yes	0.7143	0.8571
No	0.2857	0.1429

Strata 7

Safety in room	Single room	Double room
Yes	0.8636	0.80
No	0.1364	0.20

Strata 8

Safety in room	Single room	Double room
Yes	0.7586	1
No	0.2414	0

Strata 9

Safety in room	Single room	Double room
Yes	0.85	0
No	0.15	0

Strata 10

Safety in room	Single room	Double room
Yes	0.9286	1
No	0.0714	0

Strata 11

Safety in room	Single room	Double room
Yes	0.9231	1
No	0.0769	0

Strata 12

Safety in room	Single room	Double room
Yes	0.7826	1
No	0.2174	0

Strata 13

Safety in room	Single room	Double room
Yes	0.8571	0.75
No	0.1429	0.25

Strata 14

Safety in room	Single room	Double room
Yes	0.7826	1
No	0.2174	0

2. Ability to study in room at night and Availability of study chair in room

Strata 1

Study in room at night	Study chair	
	Yes	No
Yes	0.7727	0
No	0.2273	0

Strata 2

Study in room at night	Study chair	
	Yes	No
Yes	0.7843	0.50
No	0.2157	0.50

Strata 3

Study in room at night	Study chair	
	Yes	No
Yes	0.8718	1
No	0.1282	0

Strata 4

Study in room at night	Study chair	
	Yes	No
Yes	0.6774	0
No	0.3226	0

Strata 5

Study in room at night	Study chair	
	Yes	No
Yes	0.7778	0.50
No	0.2222	0.50

Strata 6

Study in room at night	Study chair	
	Yes	No
Yes	0.8077	0.50
No	0.1923	0.50

Strata 7

Study in room at night	Study chair	
	Yes	No
Yes	0.7308	0
No	0.2692	0

Strata 8

Study in room at night	Study chair	
	Yes	No
Yes	0.8214	1
No	0.1786	0

Strata 9

Study in room at night	Study chair	
	Yes	No
Yes	0.80	0
No	0.20	0

Strata 10

Study in room at night	Study chair	
	Yes	No
Yes	0.7931	0
No	0.2069	0

Strata 11

Study in room at night	Study chair	
	Yes	No
Yes	0.8077	0
No	0.1923	1

Strata 12

Study in room at night	Study chair	
	Yes	No
Yes	0.7917	1
No	0.2083	0

Strata 13

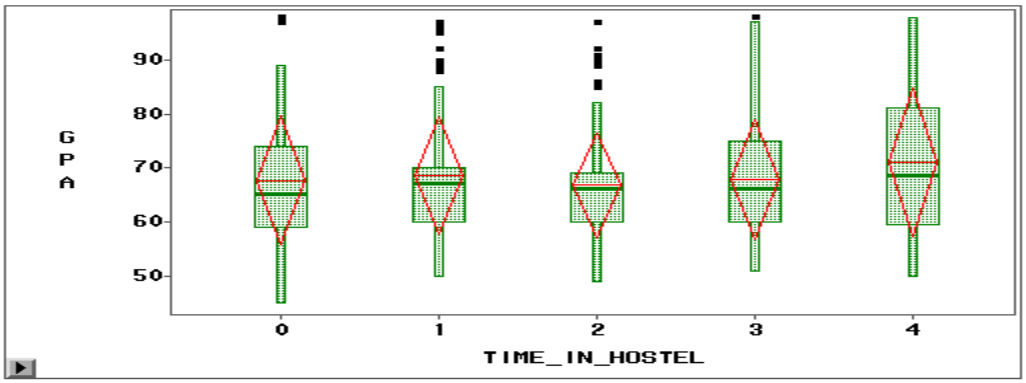
Study in room at night	Study chair	
	Yes	No
Yes	0.7917	1
No	0.2083	0

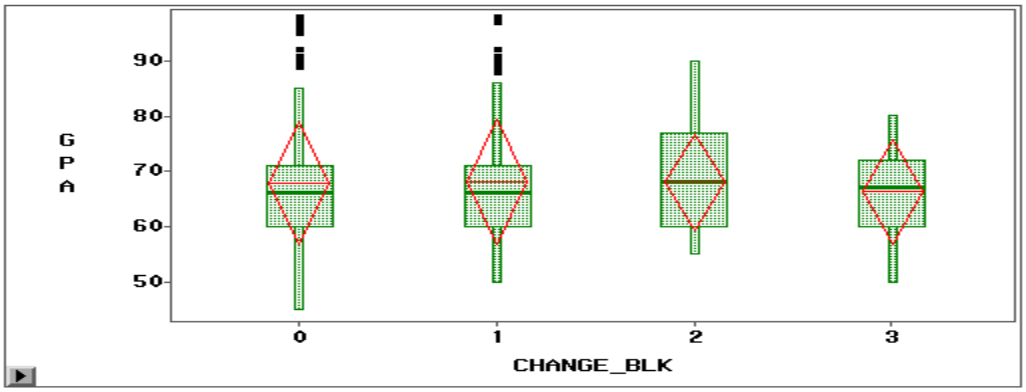
Strata 14

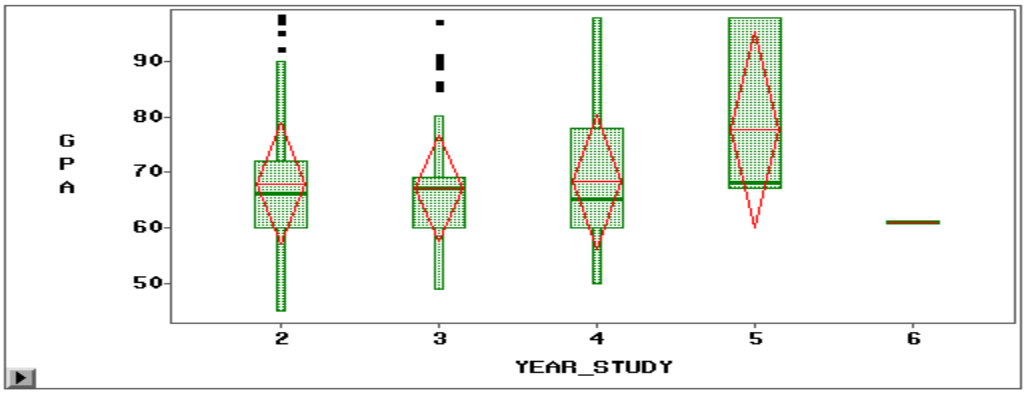
Study in room at night	Study chair	
	Yes	No
Yes	0.84	0
No	0.16	0

APPENDIX III

Figure 1: Box and whisker plots of GPA vs time spent in the hostel, number of times students change blocks, current year of study and time spent on study







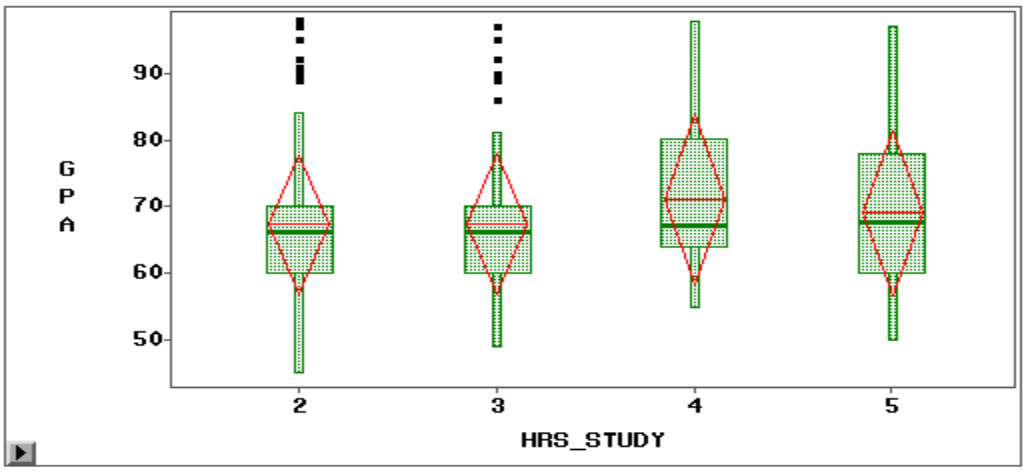


Figure 4: Residual vs predicted plot and normal QQ-plot

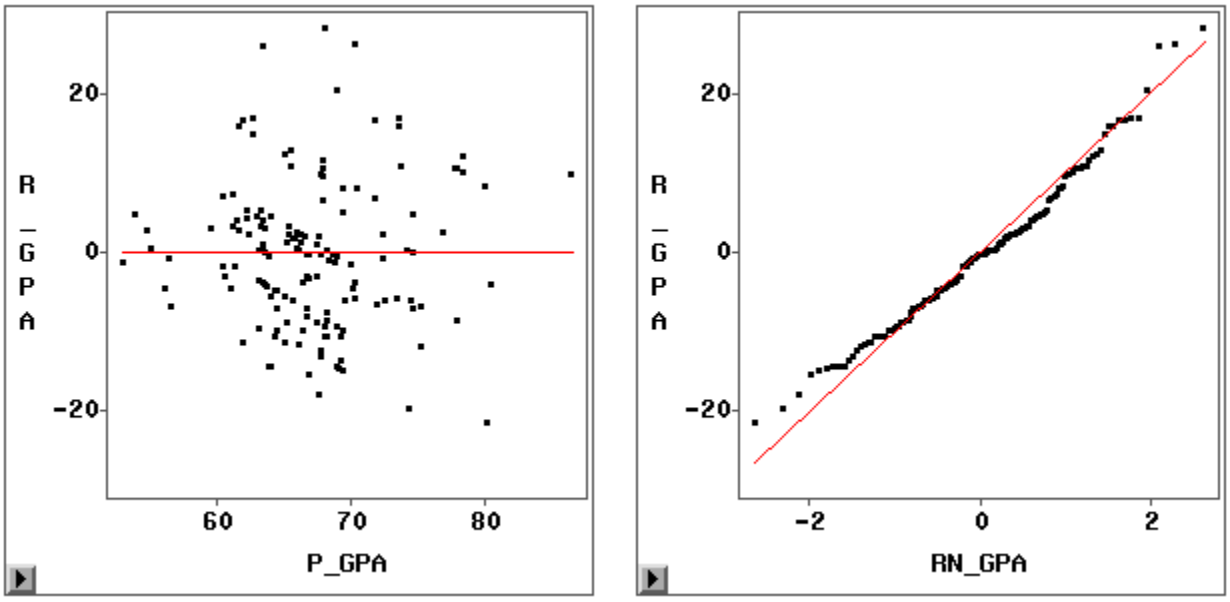
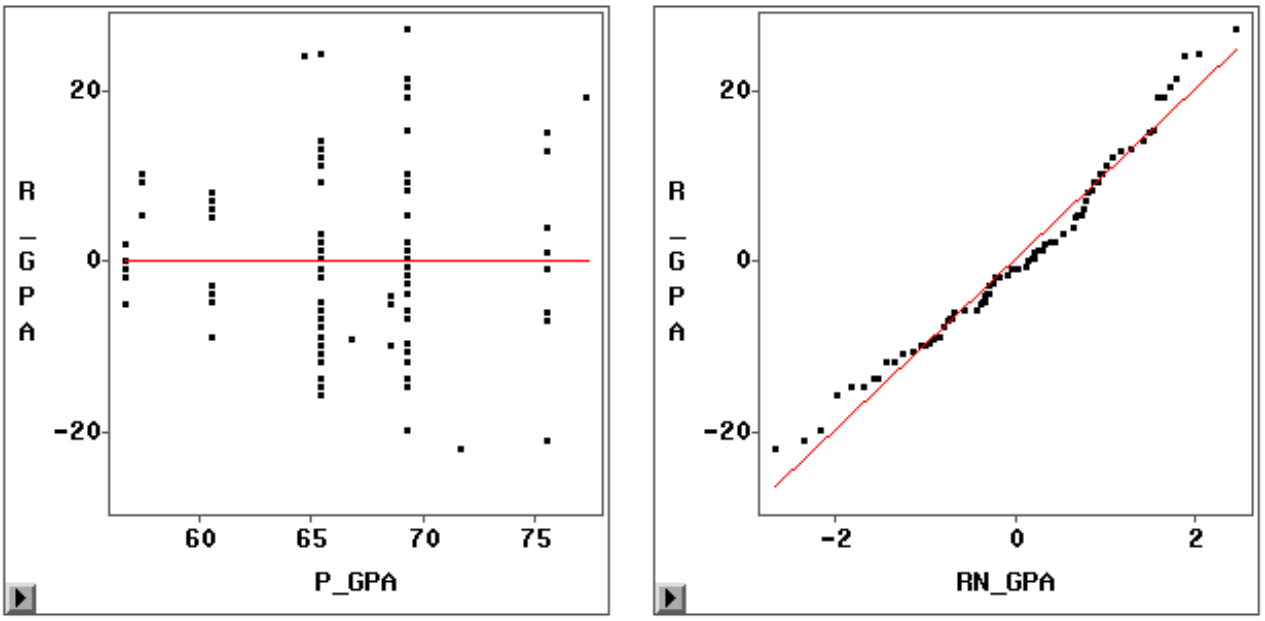


Figure 6: Residual vs predicted plot and normal QQ-plot



REFERENCES

Linda B.Bourque and Eve P.Fielder (1995)
How to conduct self – administered and mail surveys; Volume 3

George W.Cobb (1998)
Introduction to Design and Analysis of Experiments

Donald C. Weber and John H. Skilllings (2000)
A first course in the design of experiments (A linear models approach)

What work requires of schools – A SCANS report for America (2000)

Isadore Newman and Keith McNeil (1998)
Conducting Survey Research in the Social Sciences

Rea L.M and Parker R.A (1992)
Designing and conducting survey research: A comprehensive guide. San Fransisco CA. Josey Bass

Newman I, Benz C.R, Weis D and McNeil K (1997)
Theses and Dissertations: A guide to writing in the Social and Physical Sciences. Lanham, MD: University Press of America

Alwin D.F (1978).
Survey Design and analysis: Current issues. Beverly Hills CA, Sage Publications

Fowler F.J (1995)
Improving Survey questions, Design and Evaluation. Thousand Oaks, CA, Sage Publications

Maura E Stokes, Charles S Davis and Gary G Koch (1995)
Categorical Data Analysis using the SAS system: Cary, NC, SAS Institute Inc, NC, USA

Alan Agresti (1990)
Categorical Data Analysis: John Wiley & Sons Inc

Sandra D Schlotzhauer and Ramon C Littell, Ph.D (1991)
SAS System for Elementary Statistical Analysis: SAS Institute Inc, Cary, NC, USA

Jay Devore and Roxy Peck (2001)
The Exploration and analysis of data, Fourth edition, Duxbury, CA 93950, USA

John Neter, Michael H. Kutner, Christopher J. Nachtstein and William Wasserman (1996)
Applied Linear Regression Models, Third edition, The McGraw-Hill Companies, INC