SOME APPROACHES TO MODELLING NEED-BASED FINANACIAL AID TO NEEDY STUDENTS IN THE UNIVERSITY OF GHANA

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This thesis is submitted to the University of Ghana, Legon in partial fulfillment of the requirement for the award of **MPhil Statistics Degree**

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DECLARATION

I hereby declare that this submission is my own work towards the University of Ghana Masters of Philosophy in Statistics degree and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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ABSTRACT

It was asserted that University and university systems around the world are faced with rapid growing demand and decreasing or static government investment (Marcucci and Johnstone, 2010). In response to this assertion, many countries introduced cost-sharing in order to preserve the quality of higher education. In order not to deny academically talented young people from poor families from accessing higher education, governments and individual institutions started offering financial assistance to needy students. For this same cause the University of Ghana established a Student Financial Aid Office (SFAO) in 2005 which aims at awarding scholarships to needy but brilliant students. Little is known about how the SFAO awards its scholarship. Many countries have adopted the means testing method to enable them target the scarce funds to only needy students. Hence the aim of this study is to develop a statistical model (a means testing statistical model) for assessing the need of a student who applies for financial aid and awarding the scholarship accordingly. A random sample of 384 undergraduate regular University of Ghana students was selected to fill a questionnaire on a wide range of questions. Factor analysis was used to extract critical factors which were used to assess the need levels of the students and responses of each respondent were scored based on weights assigned to the variables. The scores were then used to compute the Relative Need Index for every respondent; furthermore, students were categorized into five need groups according to their need levels. It was found out that only 2.7% of students sampled fell in the most needy group and 15.6% were in the least needy group. On the other hand, majority of the students were in the middle level class which are the needy and the less needy groups, constituting 23.1% and 47.3% of the total sample respectively. It was concluded that information on income is difficult to come by in our part of the world, therefore the family income component was not included in the analysis. It was also established that, even though means testing has its challenges it is adopted by countries and institutions in order to allot financial assistance to students efficiently. The developed means testing formula was recommended to the University of Ghana for adoption.

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LIST OF ABBREVIATIONS AND ACRONYMS

SFAO ---------- Students Financial Aid Office

SISBEN ---------- Sistema de Seleccion de Beneficiarios para Programas Sociales

NSFAS ---------- National Student Financial Aid Scheme

FAFSA ---------- Free Application for Federal Student Aid

EFC ---------- Expected Family Contribution

fpc ---------- Finite Population Correction

CGPA---------- Cumulative Grade Point Average

ICETEX---Instituto Colombiano de Crédito Educativo y Estudios Técnicos en el Exterior

ACCESS ---------- Acceso Con Calidad a la Educacion Superior

DEFINITION OF TERMS

Communality – Total amount of variance an original variable shares with all other variables included in the analysis.

Correlation Matrix – Table showing the intercorrelations among all variables.

Factor Loading – Correlation between the original variables and the factors.

Factor Matrix – Table displaying the factor loading of all variables on each factor.

Factor Rotation – Process of manipulation or adjusting the factor axes to achieve a simpler and pragmatically more meaningful factor solution.

Factor Scores – They are Composite score estimated for each respondent on the derived factors by factor analysis (Naresh, 2004).

Multicollinearity – Extent to which a variable can be explained by the other variables in the analysis.

Orthogonal – Mathematical independence (no correlation) of factor axes to each other.

Varimax – The most popular factor rotation methods focusing on simplifying the columns in a factor matrix.

SISBEN is a composite welfare index used as a targeting system for social programs in Colombia. It is a function of a set of variables that can be grouped into four categories:(1) housing and home appliances; (2) public utility services; (3) human capital endowment and economic risk (schooling of oldest wage earner, mean schooling for family members 12 years and older); and (4) family demographics, unemployment, dependency ratio and per capita income (Marcucci and Johnstone, 2010).

fpc – the finite population (fpc) factor is used to adjust a variance estimate for an estimated mean or total, that this variance only applies to the portion of the population that is not in the sample.

Class Ranges of the University of Ghana

CGPA	Class Division
3.60 – 4.00	First Class Division
3.25 – 3.59	Second Class Upper Division
2.50 – 3.24	Second Class Lower Division
2.00 – 2.49	Third Class Division

1.5 – 1.99	Pass
Below 1.5	Fail

CHAPTER ONE

INTRODUCTION

1.1 Background

Marcucci and Johnstone (2010) asserted that universities and university systems around the world are faced with rapidly growing demand and decreasing or static government investment. Marcucci and Johnstone again acknowledged that, many countries have introduced tuition fees and other elements of cost sharing in order to preserve or even expand capacity and protect quality in higher education as government investment curtails. At the same time, universities are also working to enhance higher education's accessibility to academically talented young men and women from poor and rural families who are not in a position to cover significant tuition and other fees by offering them financial assistance (Marcucci and Johnstone, 2010).

The University of Ghana is no exception to this assertion. In an attempt to alleviate or minimize the problem of denying talented but needy students the opportunity to attain higher academic credentials, the University plausibly established a Students Financial Aid Office (SFAO) in the year 2005. The mission of the SFAO is as follows:

The SFAO supports the mission of the University to develop world-class human resources with capabilities to meet national development needs.

It also aims at significantly reducing or eliminating financial barriers that might prohibit or inhibit students' access to education at the University of Ghana.

They provide financial assistance to students who, without such assistance, may probably not be able to readily access or meet educational and other expenditure at the University (SFAO flyer). Since the establishment of the SFAO in 2005 to 2012, a total of 1,210 students out of the 2,012 who applied were awarded the scholarship, that is, approximately 60% of the applicants were successful (SFAO flyer). From the number of beneficiaries 1,074 were male and 136 female out of the 1,800 male and 212 female applicants respectively (SFAO flyer).

Looking at this all important initiative by the University of Ghana, the researcher deemed it appropriate to develop a statistical model. This model could serve as a tool for the SFAO to scientifically select needy applicants to be awarded the scholarship by using the means testing methodology. This is in order to enhance the accuracy and efficiency of the existing selection criteria, amount given to each student based on level of need and also to eliminate any possible human bias during selection.

According to Tekleselassie and Johnstone (2004), the sharp increases in tuition fees and other parent- or student – borne costs must be met with some form of targeted subsidies in the form of means tested grants and/or loans if cost-sharing is not to preclude the

possibility of higher education for the majority of families with low incomes. Tekleselassie and Johnstone again drew attention to the fact that one of the very great dilemmas for higher educational policy in Africa and virtually all developing countries is means testing – determining and verifying the amount that a family can reasonably be expected to contribute towards its children's higher education.

Marcucci and Johnstone (2010) hold the view that means testing is a form of subsidy targeting which attempts to distribute at least some of the higher educational subsidies, such as low or no tuition fees, grants or subsidized loans, and/or access to lodging, on the basis of the student's or his/her family's need, or its estimated ability to pay for some of the underlying costs of education. Marcucci and Johnstone again argued that the success of student assistance policies in meeting their objectives in a financially sustainable manner ultimately rests on fair and accurate means testing that ensures financial assistance to eligible students and families and avoids or minimizes awards to non-poor students.

Ngolovoi (2008) emphasized that means testing is specifically used to winnow out students from wealthy backgrounds who can access and participate in higher education, leaving only the needy to benefit from the Financial Aid. Malik and Chanthy's study (as stated in Qingyue, Beibei Y. and Liying J, 2010) revealed that, means testing was thought of being the most effective and expensive targeting method compared with other targeting methods.

1.2 Problem Statement

Although the University of Ghana has an SFAO which seeks to award scholarships to needy students, there has been no study to ascertain the effectiveness of the financial aid they offer to the students or applicants. Since the globally accepted method (means testing) of targeting needy but academically able students is not employed, there is a high tendency of awarding scholarships to students from rather affluent backgrounds. If this happens then the aspirations of the University of Ghana to significantly reduce or eliminate financial barriers that might prohibit or inhibit students' access to the University might not be realized.

According to Ngolovoi (2008), in developing countries, where higher education is heavily subsidized, it is necessary to employ means testing. It is therefore prudent to institute a means testing methodology in allocating the scarce resource of the University to needy but brilliant applicants. Hence the study.

1.3 Objectives of the Study

The main objective is to develop a statistical model that would be used for targeting needy students for financial assistance and also to determine their level of need.

The specific objectives are to

i. identify the factors that would be more relevant to the development of the model;

ii. measure several socio-economic variables to be used to develop a model that discriminates needy students from non-needy students;

iii. group needy students by the level of their needs.

1.4 Significance of the study

This study stipulates suggestions which are useful in augmenting the scholarship programme and very important issues of equity, and it also advocates increased targeting of students from poor families for Student Financial Aid. This research is employing means testing methodology to make targeting of needy students more effective. The study is also to help ensure that the scarce funds available is reaching the target population (comprised of needy but academically able students) and to increase equity and access by providing funds to only needy students (Ngolovoi, 2008).

If the scholarship reaches the target population, it would first of all go a long way to benefit the individual by way of getting better jobs as well as non-monetary benefits such as the prestige associated with credentials and enhance their lives and live in good health. Secondly, the University of Ghana would benefit by achieving the mission of providing world-class human resource to the workforce. The beneficiaries might also in future contribute to the development of the University which can elevate it especially in the world ranking of universities. Finally, if the financial aid is well targeted, it will contribute in breaking the cycle of poverty for those at the bottom of the socio-economic structure and also give the opportunity to such people to return to society in the form of a

more talented and productive workforce (Marcucci and Johnstone, 2010). They are more likely to contribute to tax revenue and to the nation's economic and cultural productivity.

This study is sorting to develop an improved formula or method for determining the financial need of students.

Heller (2004) made a very challenging statement that in the era in which tuition fees are rising much faster than the ability of families to pay for university education – particularly lower-income families; public and institutional financial aid need to be used in the most effective and efficient manner as possible. Heller again argued that in the economic world of highly constrained social welfare maximization, giving scarce financial aid resources to people who don't need them is wasteful, unnecessary, unproductive, and comes as the price of adequate and appropriate student financial aid for others who could not afford to complete without assistance.

1.5 Limitations of the Study

1. The study involved only regular undergraduate students in levels 200 to 400 of the University of Ghana.

2. This model can be used only in the University of Ghana because of the method used. It cannot be applied to data from a different institution.

1.6 Organisation of the Study

The study comprises of five chapters. This introductory chapter is the first and it presents the background of the study, problem statement, objectives and relevance of the study. It is followed by chapter two in which literature related to the study is reviewed – issues reviewed include cost sharing in higher education, the concept and financial aid policies and formulae in colleges, juxtaposing merit-based with need-based financial aid, the means testing approach in awarding financial assistance to needy students and finally a review of the means testing formulae used by some countries. Chapter three discusses the methodology of the study. The results of the data analysis are presented and discussed in chapter four and finally, the summary, conclusions and recommendations of the study are reported in chapter five.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0 Introduction

This chapter sets out a frame work that forms conceptual foundation for the research. It is in six divisions, comprising higher education funding, cost sharing in higher education, financial aid, means testing, discussion of the two types of financial aid (need-based and merit-based) and means testing formulae adopted by some countries.

2.1 Higher Education Financing

According to Johnstone (2003), higher education at the beginning of the 21st century has never been in greater demand, both from individual students and their families. For the occupational and social status and the greater earnings it is presumed to convey, as well as from governments for the public benefits it is presumed to bring to the social, cultural, political and economic well-being of countries, there has been an increasing demand for the past few decades (Johnstone, 2003).

The World Bank (2010) concludes that in most Sub-Saharan African countries, enrolment in higher education has grown faster than financing capabilities and that public funding in most countries are already overstretched. According to the report this problem of lack of resources has resulted in severe decline in the quality of instruction and that it will not be sufficient to respond to the growing demand for access to higher education while

delivering a level of quality that provides students with the skill necessary to succeed in current and future markets. The report made mention of some easy ways out that some countries are implementing – private higher education which is experiencing a spectacular growth in Africa and Cost-Sharing programmes which are being implemented in many universities accompanied by students loans and financial aid for low – income students.

Higher education plays a key role in training qualified individuals to establish more enterprises and institutions and thus allocate resources more efficiently and through research and increased knowledge in higher education can also help to address the challenges arising from population growth, endemic diseases, urbanization, energy costs and climate change (World Bank, 2010). The report further challenged Sub-Saharan African countries that in order for them to reap the benefit of this investment in human capital, higher education institutions must have financing to provide quality training and sound professional prospects to their students. The World Bank challenging African countries to provide quality training to students supported their observation of increased demand for higher education with some figures. The reports claims that over the past 15 years, the total number of students pursuing higher education tripled, climbing from 2.7 million in 1991 to 9.3 million in 2006 (an annual average rate of 16 percent), while public resources allocated to current expenditure only doubled (an annual average rate of 6 percent).

The Ghana government's funding of tertiary education started in 1948 when the University of Gold Coast, now University of Ghana, was established to produce the manpower requirements of the country (www.ghanaweb.com/GhanaHome page/feature/article.php). During that era, University students were treated as first-born babies and were provided with everything, including pocket money by government just to ensure that the needed psychological and physiological comfort was obtained for smooth scholarly work (www.ghanaweb.com/GhanaHome page/feature/article.php).

Due to the higher demand for higher education, the government could not adequately fund these institutions leading to lack of basic services such as professors, laboratories, equipments, housing, and other facilities so needed (Amenya, 2009). Amenya alluded that as a result of the lack of basic facilities, many people were denied access and that the model of basically free for all which in principle did not discriminate against anyone with the basic standards for entry needed to be reviewed. Amenya (2009) argued that higher education financing has always been a thorny issue for parents, policy makers and other stakeholders in the arena of higher education.

2.2 Cost Sharing in Higher Education

According to Johnstone (2003), "cost – sharing is generally thought of as the introduction of or especially sharp increase in, tuition fees to cover part of the costs of instruction, or of user charges to cover more of the costs of lodging, food and other expenses of student living that may have hitherto been borne substantially by governments (taxpayers) or institutions".

Cost sharing was introduced in Ghana in the 1997 through the adoption of the 'Akosombo Accord' that divided responsibility for university funding between the government (responsible for 70 percent of total funding) and three other sources (30 percent) including university internal revenue-generation, private donations and student tuition fees. Student academic and residential facility user fees were introduced in 1998 (www.ghanaweb.com/GhanaHome page/feature/article.php). At this juncture students from very low income families would have difficulties in pursuing higher education; this gave rise to institutions introducing Financial Aid to assist needy students pursue and complete their higher education.

2.3 Financial Aid

Carey (2007) drew attention to the fact that every year, university education gets more expensive. On the question of student financial aid, this study supports the position of Carey who maintains that while policy makers focus on student loans, another important form of student financial assistance has received less scrutiny and that is aid provided directly by individual universities. Fenske, Porter and DuBrok (2000) made an assertion about financial aid policy and programmes that they are the primary vehicles to ensure economic status is not a barrier, hence, the importance of understanding the nature of financial aid received by students from low-income families as it relates to their persistence and degree completion.

It was argued in the World Bank (2010) report that scholarships and other forms of student financial aid need to be better targeted and rationalized to better meet the goals of

equity and efficiency. The report also claims that in many countries, grant and scholarship allocation criteria are linked to academic performance rather than to socioeconomic disadvantages, or priority disciplines for the country's development, which this study is not in full support of. Financial aid is very crucial in higher education since it will go a long way to benefit both the individual and the entire nation. Fenske et al (2000) argued that if we educate tomorrow's workforce, then we are also meeting technical labour force of the nation.

Several authors have investigated the impact of financial aid on university persistence and graduation but their results were inconclusive and range from positive to negative and to no effect altogether (Alon, 2005). The results of Alon's study actually argues that interrelationship between aid eligibility and graduation mask the positive impact of financial aid on graduation. Going on further with the findings made, Alon contended that financial aid eligibility (except for merit-based aid) exerts a negative effect on persistence while increase in the dollar amount is positively related to successful completion of university education. Even though this subject is not most germane to this study, the researcher thinks its findings are worth noting.

Since in the University of Ghana it is only a very small proportion of the student population that apply for financial aid, many may think it is not worth researching into, but this study is in agreement with the findings of Doyle (2010), and wrote "some authors describe the history and background of each type of aid, and concluded: students

financial aid programmes play a major role in who participates in post secondary education".

2.4 Merit-Based versus Need-Based Financial Aid

Several authors have written about the advantages and disadvantages of need-based and academic merit-based financial aid. This section juxtaposed what researchers have said about the two types of financial aid and to find out which of these two methods is more beneficial than the other.

Toutkoushin and Shafiq (2009) put across that access to higher education for low-income populations may have been hindered by the trend of shifting financial support away from need-based aid towards academic merit-based financial aid because low-income populations are less likely to qualify for merit-based aid. Their findings show that states are better off if they awarded financial aid on the basis of need rather than merit. They also claim that if it is true that students who would be eligible for merit-based aid are more likely than students who are normally eligible for need-based aid to go through college, then need-based aid leads to larger gains. In lieu of maintaining their findings, Toutkoushin and Shafiq claimed that it is not to say, however, that universities should not award merit-based aid to students, and made mention of an equally compelling argument which could be made that universities award merit-based aid and not need-based aid to students based on the assumption that the goal of universities is to maximize their prestige or reputation.

Heller (2004), interestingly put across that both states and institutions have used measures of academic merit in place of financial need as the basis for awarding grants and scholarship and also observed that both are abandoning the concept of "exceptional financial need" as the factor determining who should receive aid. Heller holds the view that the difference between the cost of a student attending the university (including tuition, hall/hostel, books transportation and other expenses) and the contribution of the family must be the criteria to determine the amount of financial aid for which the student would qualify, and also thinks that this can be achieved by employing a complex formula as "needs analysis" which takes into account family income, assets and other characteristics to determine the amount that a student and family could afford to contribute to university education. Heller reiterated that merit-based scholarships go disproportionately to students who would have gone through the university education even without the universities assistance, while need-based aid helps those, according to his research findings, require assistance to complete whatever programme they pursued. Heller argued that students least likely to be awarded merit scholarship come from families with poor economic background and populations that have traditionally been underrepresented in the university, and said that this hinders the potential to increase university graduation among low-income students.

Heller found it interesting that even within the category of need-based aid, students with higher income background saw the largest growth in grant dollars, indicating that institutions probably used increasingly liberal definitions of financial need in the United States of America. It is therefore important for institutions to develop a formula or model

for determining the financial need of a student. This concern expressed by Heller is the key aim of this research work, which is, developing a model to determine the financial need of a student who applies for the financial aid. The increasing use of academic merit rather than financial need, as the fundamental criterion for the awarding of financial aid has important implications on college access in the United States (Heller, 2004). According to Heller, "research on tuition prices and financial aid over the past three decades have consistently found that, short of keeping tuition prices as low as possible, financial aid targeted at needy students is the best policy for increasing college access among underrepresented students".

Even though this research focuses mainly on need-based financial aid, it considers giving academic merit some room in granting financial assistance. Financial Aid is a very crucial element in higher education and once somebody becomes a student of the University of Ghana, that person could access this financial aid.

2.5 Means Testing

Tekleselassie and Johnstone (2004) in their report put across the idea that means testing is a form of subsidy targeting which attempts to distribute at least some higher education subsidies on the basis of need or estimated ability to pay. Ngolovoi (2008) thinks that means testing is specifically used to screen out students from wealthy backgrounds who can afford to access and participate in higher education, leaving only the needy to benefit from the financial aid.

Ngolovoi (2008) reiterated that averagely, families in most part of Africa have extremely low income and resources available to many or most of them are insufficient to meet new expectations of paying tuition fees as well as costs of students living. Ngolovoi emphasized that sharp increases in tuition fees and other parent- or student-borne costs must be met with some form of targeted subsidies in the form of means tested grants and/ or loans if cost-sharing is not to preclude the possibility of higher education for the majority of families with low incomes.

Means testing methodology is simply to test the ability of a student's family to contribute to the financing of his/her university education and the degree to which they can contribute. There are several factors in determining the means of a family. Factor Analysis is employed to summarize the factors by grouping correlated ones.

On the premise of means tested scholarships, the university aims to achieve efficiency by targeting only the very needy who really require fund to access and participate in higher education by screening out students from affluent backgrounds (Ngolovoi, 2008). Teklesalasie and Johnstone (2004) confirmed by saying that it is apparent that people from the middle and upper social strata benefit from public services more than those from the low socio-economic strata. Ngolovoi (2008) made an assertion that in developing countries, where higher education is heavily subsidized, it is necessary to employ means testing.

The design of the means test is critical. Means testing systems, like all household targeting systems, need to be designed with care. Castañeda and Lindert (2005) identified

numerous factors that need to be considered in the design including: a) appropriate data collection strategy; b) adequate management; c) feasibility and potential accuracy of verification mechanisms; d) institutional arrangements, and e) monitoring and oversight mechanisms to ensure transparency, credibility and control of fraud. Systems take time to design; therefore, piloting and implementation are inherently context specific. A means testing system that works well in a particular country cannot simply be replicated in another and each of these factors must be considered in light of particular country characteristics and existing infrastructure (Marcucci and Johnstone, 2010).

2.5.1 Definition of Means Testing

Coady, Grosh and Hoddinott study (as cited in Ngolovoi, 2008) defined means testing as a form of individual assessment that compares resources such as income belonging to an individual or a household with some cut off. Whiles Meritosis and Wolain study (as cited in Ngolovoi) simply put it as the method of determining who is able to pay and the proportion they can pay in relation to costs of higher education. Ngolovoi (2008) holds a similar view that means testing can be defined as the process of determining whether families of loan applicants are able to contribute and the degree to which they are able to finance the education of their children. Tekleselassie and Johnstone (2004) defined means testing as a form of subsidy targeting, which attempts to distribute at least some higher education subsidies on the basis of need or estimated ability to pay.

Tekleselassie and Johnstone (2004) put across that means tested subsidy is a benefit (e.g., a grant, tuition fee discount, or access to a subsidized loan) that is targeted to families or

directly to students with minimal means. The system may call for benefits that rise with the diminishing calculated family means. Or from the opposite perspective but with the same meaning, the system may call for a grant that diminishes with increasing incomes or measured means.

2.5.2 Means Testing Formulae used by some Countries

There are several countries in the world which have employed means testing in awarding scholarships, allowances and loans and it is evident in the discussions below that there are different ways of arriving at the means tested awards in the various countries. The means testing formulae employed by some few countries in awarding various types of financial assistance are discussed below and the source of these formulae is (Marcucci and Johnstone, 2010).

2.5.2.1 Means Testing Procedure of Australia

Youth Allowance

Means testing formula:

The means test is composed of a parental income test (for dependent students), a personal income test (for both dependent and independent students) and an assets test. For the parental income test, the basic youth allowance is reduced by A$1.00(US$0.72) for every A$4.00 (US$2.88) that the income is over the threshold of A$32,800 (US$23,597). The personal income test allowance, an income-free area of A$236 (US$170) per fortnight for dependent students.

Income that exceeds the income free area will reduce allowance payment. Under the assets test, if a dependent student's family assets exceed A$571,500 (US$ 411,150) no allowance may be paid. The assets test does not include the family home and the value of farm or business assets are discounted by 75 percent. (Source: Marcucci and Johnstone, 2010). It could be realized from the Austrian means testing formula for the youth allowance that income is the principal source of information used in the formula. This implies that income data is reliable in Australia. On the other hand, income data in Ghana is not easily accessible, even when provided is not reliable because they are over quoted or under quoted.

2.5.2.2 Means Testing Procedure of Chile

Fondos Solidarios de Credito Universitario & Credito de la Ley 20.027 para Financiamento de Estudios de Education Superior

Means testing formula:

For the Fondos Solidarios de Credito Universitario, students must be from among the four poorest income quintiles. The loan finances all or part of the reference tuition fee for the course of study. For the Credito de la Ley 20.027 para Financiamento de Estudios de Education Superior, the applicant indicates the size of the loan that he/she is applying for (within minimum and maximum parameters set by the scheme). The Comision Ingresa (not the individual financial institutions) ranks the qualified applicants from poorest to richest and awards loans starting with the poorest. Academic performance is used to filter applicants (weed out those who are not eligible). Then socioeconomic level is the only indicator that is used to allocate credit. (Source: Marcucci and Johnstone, 2010)

2.5.2.3 Means Testing Procedure of Colombia

ICETEX ACCESS grant/loan

Means testing formula:

For targeting purposes several criteria are considered, including: the applicant‘s academic merit (given weight of 73.2%), his/her estrato socioeconomic (given weight of 11.5%), accreditation of applicant‘s higher education institution (11.5%), and the affirmative action and retention activities of the institution (3.8%). For allocation purposes, students in SISBEN levels 1 and 2 (poorest) are eligible for ICETEX loan covering 50 percent of their tuition fees and a grant covering an additional 25 percent. They also receive a subsidized interest rate. If a student does not have a SISBEN, his/her social strata are used for allocation. If she is in social strata 1 or 2, he/she will get credit covering 75 percent of tuition fees only, while if he/she is in strata 3 to 6, he/she will access credit for 50 percent.

The estrato socioeconomic in Colombia is based on the outside characteristics of a neighborhood and its dwellings. Neighborhoods and rural areas are grouped into 6 strata (poor to rich) and used to target public services and subsidies in Colombia. (Source: Marcucci and Johnstone, 2010).

2.5.2.4 Means Testing Procedure of Costa

Beca de Asistencia Socioeconomica (and Beneficios Complementarios)

Means testing formula:

A regression formula is used to estimate the socioeconomic level of the applicant's household and assign them to one of eleven categories that determines eligibility for tuition fee waivers and other financial assistance. (Source: Marcucci and Johnstone, 2010)

2.5.2.5 Means Testing Procedure of Kenya

Higher Education Loans Board loan and bursary

Financial information collected for use in means test:

Family income

Information collected as proxy indicators of likely family financial strength or for use in the means test:

Information collected for corroboration purposes:

- Parental education
- Parental occupation
- Number of applicants children in school
- Number of parents' children in school
- Number of siblings
- Educational expenditure on siblings
- Family expenditure

Information collected for use in the means test:

- Secondary school attended

 Single parent household or not.

Means testing formula (2009/2010): **Family Income**	**Loan Award**	**Bursary Award**
≤Kshs 250,000 (US$8,470) single parent household	Ksh 55,000 (US$1,860)	Female: Ksh 7,000 (US$237) Male: Ksh 6,000 (US$203)
Ksh 250,000-400,000 (US$8,470-13,550) single parent household	Kshs. 50,000 (US$1,695)	Female: Kshs. 6,000 (US$203) Male: Kshs. 5,000 (US$169)
Kshs 400,000 – 850,000 (US$8,470 – 28,795) single parent household	Kshs. 45,000 (US$1,524)	Female: Ksh 5,000 (US$169) Male: Kshs 4,000 (US$136)
≤Kshs 250,000 (US$8,470) two parent household	Ksh 45,000 (US$1,524)	Female: Ksh 5,000 (US$169) Male: Kshs 4,000 (US$136)
Kshs 250,000 – 600,000 (US$8,470 – 20,325)	Kshs. 40,000 (US$1,355)	No bursary
Kshs. 600,000 – Kshs. 850,000 (US$20,325 – 28,795)	Kshs. 35,000 (US$1,186)	No bursary
>Kshs. 850,000 (US$28,795)	No loan	No bursary

Source: Marcucci and Johnstone, 2010

The maximum loan amount is based on secondary school attended so that even if a student comes from a single parent household with an income of less than Kshs 250,000, if he/she attended a national or high cost private school the maximum loans to which he would be privy is Kshs. 35,000. The other loans maximums are as follow:

Provincial school: maximum of Kshs. 45,000

District school: maximum of Kshs. 50,000

Day school: Kshs. 55,000. Source: (Marcucci and Johnstone, 2010)

2.5.2.6 Means Testing Procedure of South Africa

National Student Financial Aid Scheme [NSFAS]

Definition of independent students:

Students that are married, widowed, divorced or orphaned or who have supported themselves for more than three years are considered independent.

Treatment of independent students:

The treatment of independent students in the means test does not differ from that of dependent students in that means test is done on household members.

Financial information collected for use in means test:

 Current year gross income (before tax – from salary, wages, grants paid out, business profit, profit from investments and any form of informal sector income) is used for all household members. Used by higher education institutions' financial aid offices to calculate disposable income (money that a family has left over after taxes have been paid and household earnings allowances have been set aside for the family's general subsistence needs as well as the individual needs of each family member).

 Number and description of dependents in the household

 Number of dependent children in tertiary education

Information collected as proxy indicators of likely family financial strength or for use in the means test:

None of these is used in means test, but some higher education institutions collect some of the following information:

 Parental assets

 Father alive or not

 Mother alive or not

 Applicant child of single parent or not

 Parents or guardians highest education levels

 Parents' or guardian‘s occupations and employers

 Structure of family dwelling

 Automobiles owned or access by family

Means testing formula:

The NSFAS means test is based on an applicant’s family’s disposable income defined as total gross income from which taxes and annual subsistence allowances (combination of General Household Subsistence Allowance and Personal Allowance), which are set annually based region and on family size, are deducted. (Marcucci and Johnstone, 2010)

2.3.2.7 Means Testing Procedure of United States

Subsidized Stafford Loan, Federal Perkins Loan, Pell Grant, and Federal Supplemental Education Opportunity Grant

Purpose of Means Testing Instrument:

Targeting and allocation

Definition of independent students: To be considered independent of his/her parents for the purposes of the FAFSA, a student must meet at least one of the following seven criteria:

 be 24 years of age or older by December 31 of the award year;

 be an orphan (both parents deceased), ward of the court, or was a ward of the court until the age of 18;

 be a veteran of the Armed Forces of the United States;

 be a graduate or professional student;

 be a married individual;

 have legal dependents other than a spouse;

 be a student for whom a financial aid administrator makes a documented determination of independence by reason of other unusual circumstances.

Financial information collected for use in means test:

Applicant (and spouse) information collected includes adjusted gross income (previous year); income tax paid; tax exemptions; balance of cash, savings and checking accounts; net worth of investments (including real estate, but not home); net worth of business or farms; education credits; child support; taxable earnings from need based employment programs; student grants and scholarships; combat pay; and untaxed income.

If applicant is dependent, the following information is collected: adjusted gross income of parents; parents' income tax; parents' exemptions; parent's earnings; parent's current balance of cash, savings and checking accounts; net worth of their investments including real estate (excluding family home); net worth of their businesses and or investment farms; education credits; child support paid; taxable earnings from need based employment programs; student grant and scholarship aid; combat pay; and untaxed income.

Information collected as proxy indicators of likely family financial strength or for use in means test

If a student is dependent, the following information is collected: number of people in parents' household; number of college students in household (Marcucci and Johnstone, 2010).

Means testing formula:

Information from the FASFA form is used by the Central Processing System to calculate an official Expected Family Contribution (EFC) that is provided to student in Student Aid Report (SAR). The schools listed in the student's FAFSA receive this information in an electronic file called an Institutional Student Information Record.

For dependent students, total allowances against parent's income (income tax paid plus tax and income protection allowances) are deducted from total income to get available income. Assets (not including family home) are multiplied by 0.12 to get contribution from assets. Parent's contribution is calculated by adding available income and contribution from assets to get adjusted available income and then using a table to get total parents' contribution from adjusted available income. Total parents' contribution from adjusted available income is divided by number in college to arrive at parents' contribution.

The Student's contribution is calculated by deducting taxes and tax allowances from student's total income and multiplying it by 0.50 to get student's contribution from

available income and adding this student's contribution from assets (total assets times 0.20). The EFC is parents' contribution plus student's contribution from available income plus student's contribution from assets. The EFC calculation is established by law. To determine need, EFC is subtracted from cost of attendance.

Marcucci and Johnstone noted that both institutional need-based grants and merit-based grants provide larger awards to families with greater total income especially at high tuition private institutions.

Scheme Award = costs (registration and tuition fees, essential books, accommodation and food) – bursaries – scholarships – academic rebates – EFC

(Source: Marcucci and Johnstone, 2010)

Some institutions choose not to fund first year students, and some take performance into account.

After studying the means testing formulae of the various countries it was realized that socio-economic status is a major determining factor followed by levels of family income which almost all countries mentioned or considered in the formulae. In the United States and South Africa, for instance, independent students are treated differently from dependent students. Marcucci and Johnstone made an observation that higher awards are given to students from high income families. This implies that means testing formulae discussed are not adequately addressing the targeting issues and therefore needs reviewing and improvement. This problem could be attributed to students not providing

correct information or errors in the computations and setting of thresholds for individual factors.

This model or means testing formula when developed will be subject to amendments periodically.

2.5.3 Factors Considered by some African Countries in Conducting Means Testing

Tekleselassie and Johnstone (2004) asserted that, it is required of parents to submit information about household income and assets in Mozambique. Merisotis and Wolanin (2002), also added that this income and asset information is normally supplemented with categorical information on parents' occupation, whether the home has running water and/or electricity, and the key mode of family transportation (e.g., car, public transportation, car and driver provided by agency, etc.)

"In Uganda, several proxy variables are used to signify income and determine ability to pay for higher education" (Tekleselassie and Johnstone, 2004). The father's level of education and the mode of transportation used are the major barometers to classify students among three income groups (Mayanja, (1998) as cited in Tekleselassie and Johnstone (2004)). Classified as high income are families with professional fathers who have more than 15 years schooling (i.e., first degree or above); businessmen fathers with private or official vehicles; and professional fathers with 15 years or less of schooling but with a personal or official car (Tekleselassie and Johnstone, 2004).

Classified as middle-income families are those whose fathers are professionals with 15 years or less of schooling but with cars and businessmen and farmers with no personal or official vehicles (Tekleselassie and Johnstone, 2004). Classified as low-income families are peasants and those who are not employed (Tekleselassie and Johnstone, 2004).

2.5.4 Justifications for Means Testing

Several authors have put across their justifications for means testing; These are critically examined.

Ngolovoi's (2008) main justification for means testing is that it addresses efficiency in the use of scholarship funds, and wrote that this can be achieved if subsidized financing strategies reach the target group, which constitutes needy students. The second justification by Ngolovoi is the case for equity, argued in the line that because middle and upper income students are easily able to afford higher education, means tested financial aid should increase access and participation of needy students. Ziderman and Hoddinott (as cited in Ngolovoi) also put across a very interesting justification that since the financial aid is purely scholarship based, means testing becomes imperative to ensure that only the needy receive funds. Marcucci and Johnstone (2010) share their view on the importance of good means testing by emphasizing that the success of student assistance policies in meeting their objectives in a financially sustainable manner ultimately rests on fair and accurate means testing that ensures financial assistance to eligible students and families and avoids or minimizes awards to non-poor students.

2.5.5 Constructing of Means Testing

There have been some methods or suggestions described by different writers as to how means testing is conducted and we present some of the shortcomings of such methods. First of all the simplest way of testing the means of a student and his or her family is getting the income of the student and the family and then subtract all expenses made by the student (including tuition fees, lodging, food and other expenses). The difference is what tells whether the family has the means to actually contribute to the student's education and the proportion it can contribute and then it would determine whether the student is eligible to receive financial assistance or not. Tekleselassie and Johnstone (2004) claimed that assets are used in addition to income to determine eligibility of targeted subsidies. They went ahead to draw attention to some shortcomings for using assets and said that the use of assets measurements may be unreliable, especially where information may be withheld from relevant officials and added that assets may not serve as a corroboration of reported current income but may be assumed to be a part of parental contribution in a means testing approach.

Tekleselassie and Johnstone went on to establish that income is not the only indicator for assessing means or need and the fact that there are other indicators other than income and assets which are referred to as categorical indicators and also known as proxy means testing; a categorical approach generally employs multiple indicators to supplement whatever is available on income and assets. They attributed some strong advantages associated with categorical indicators; the first advantage was that categorical indicators maximize the social objective for which the scholarships are designed. Secondly, they are

difficult to manipulate and relatively easy to observe (hence less costly to measure), they can be used either as an alternative or as a supplement to income testing. Lastly, in practice almost all means tested schemes are conditional not only on income but also on satisfying certain categorical criteria. Tekeleselassie and Johnstone gave examples of what the categorical indicators could be – occupation, type of housing, place of residence, automobile ownership, family size and age of children, gender, ethnicity and other characteristics.

Coady, Grosh and Hoddinott (as cited in Tekleselassie and Johnstone, 2004) in agreement to what had been written previously, maintains that in proxy means testing, it is first important to identify variables that exist in the surveys that are highly correlated with household income that are observable and easily manipulated by households in an attempt to benefit from scholarships or other social programmes. They made an assertion which is paramount to this study that; countries, institutions or bodies can determine their choices of variables which they can then associate with different weights statistically. Coady et al., made contributions by claiming that a key feature for proxy means testing is that it has the merit of making replicable judgments using consistent and visible criteria which means it should guarantee "horizontal equity" – the same or similar households receive the same treatment even if evaluated by different officials or by the same official on different days.

Tekeleslassie and Johnstone brought to the fore some problems that can be associated with proxy means testing in spite of their usefulness in supplementing the information

obtained through determining or estimating income. The main problem that was pointed out was imperfect targeting which may arise either from a loose connection between the categorical indicator and the benefit (example, family size or place of residence and eligibility for scholarships), or from error of ambiguities in identifying the categorical indicator itself (example, place of residence or ethnicity). Atkinson's, Sen's and Walle's studies (as cited in Tekeleselassie and Johnstone, 2004) revealed that these imperfections may lead to Type I errors, resulting in the exclusion of eligible families and they can also lead to Type II errors, which would result in scholarships awarded to students who are not in need and ought not have been eligible. From the discussions above on how to conduct means testing, its advantages and short comings, the researcher finds out that there has not been an almost perfect method for determining the means or the need of a student or a family. This study is conducted to make a contribution to the improvement of the method. This acknowledgement was confirmed by Tekleselassie and Johnstone (2004) by their observation that "even supplementing income/assets measurements with categorical indicators does not solve all the limitations of subsidy targeting and that the search for workable approaches is a continuous exercise – one which is just beginning in only few developing countries".

The method developed in this study is exhaustive enough to address some of the limitations faced by other means testing formulae.

2.5.6 Limitations of the Means Testing Approach

These following limitations were put across by Tekleselassie and Johnstone (2004)

1. There may be no effective way of getting information on the income except, perhaps, of those in the formal sector.

2. The market value of real property may not be clearly known.

3. Finally, to the extent that real property might be included in assessing financial means, there may be few ways to convert this asset to cash short of selling it.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter outlines the research methodology employed to achieve the objectives of the study which were listed in the first chapter. It first of all discuses the study design, followed by the study population, sample size estimation and sampling technique, method of data collection, data explorations (preliminary analysis) and the tool used for the data analysis.

3.2 Research Design

The study design adopted in this work was quantitative. In this approach, a reasonable portion of the population was selected and a large amount of data was gathered on them. Hence, the information gathered from the participants was used to make generalizations which cover the entire population from which the participants were taken. The information on the sample was collected through questionnaire administration.

The quantitative design was chosen for this study because the outcome of the study would be generalised to cover the entire regular student population.

3.3 Study Population

The University of Ghana was founded in 1948 as the University College of Gold Coast on the recommendation of the Asquith Commission on Higher Education in the British colonies (Handbook for Graduate Studies, 2010). It was established for the purpose of providing for and promoting university education, learning and research (Regulations for Junior Members and Students Facilities, 2012).

The student population during the 2012/2013 academic year is 35,638 (with a male/female ratio of about 3:2) the University of Ghana is the oldest and largest of the six public Universities in Ghana. The total number of students included 4,437 at the Accra City Campus and 4,532 undertaking their studies by the Distance Mode. Also included in this number are 3,196 post-graduate students and 3,596 students on modular or sandwich programmes. (Regulations for Junior Members and Students Facilities, 2012).

The campus of the University lies between about 13 kilometres north-east of Accra, the capital of Ghana, at an altitude of between 90 and 100 metres. Within this dimension are facilities such as Halls of Residence, Departments, Lecture Halls, Laboratories, the Balme Library and Auditoriums (Regulations for Junior Members and Students Facilities, 2012). There are markets and supermarkets on the campus and across the road, the Accra-Dodowa road from the main University gate is a Police Station, a University Hospital and housing for Junior Staff of the University. The College of Health Sciences has its administration as well as the Medical/Dental/Allied Health Sciences located at the Korle-

Bu Teaching Hospital, which is about three kilometers west of the centre of Accra and about 18 kilometres from the main University campus (Regulations for Junior Members and Students Facilities, 2012).

Academic life of the University of Ghana is centered around Colleges, Faculties, Institutes/Schools and Centres of Research/Learning (Regulations for Junior Members and Students Facilities, 2012).

Colleges

Under colleges we have Medical School, Dental School, School of Allied Health Sciences, School of Public Health, Noguchi Memorial Institute for Medical Research, School of Nursing and School of Pharmacy (Handbook on Regulations for Junior Members and Students Facilities, 2012). There is also the College of Agriculture and Consumer Sciences which is constituted by two Schools and a Research Institute, and they are School of Agriculture, School of Veterinary Medicine; and the Institute of Agricultural Research under which are Livestock and Poultry Research Centre – Legon, Soil and Irrigation Research Centre – Kpong and Forest and Horticultural Crops Research Centre – Kade (Regulations for Junior Members and Students Facilities, 2012).

Faculties – Arts, Science, Law, Social Studies, Business School and Engineering Sciences.

3.4 Source of Data

The University of Ghana students comprise of graduate and undergraduate students and within these two groups are Accra City Campus, Distant Learning, Part-time, Fee-paying and Regular Students. The study sampled regular undergraduate students who are in levels 200, 300 and 400. Level 100 students were not included because there was an element of CGPA (Cumulative Grade Point Average) in the Questionnaire which they did not have at the time the study was conducted.

3.5 Sampling Procedure

The items discussed here are estimation of sample size and the procedure by which the members of the sample were selected.

3.5.1 Sample Size Estimation

Ascertaining the sample size is a very crucial part of the study and there is no mysterious formula that will tell us the perfect sample size for this study, we therefore need to choose a formula that would be more appropriate so far as this study is concerned. In the process of deciding on what proportion of the population to be directly studied, two factors were considered – margin of error and precision (Lohr, 1999). According to Lohr (1999), in designing a Simple Random Sample one must decide what amount of sampling error in the estimates is tolerable and must balance the precision of the estimates with the cost of the survey. There are several formulae for calculating the size of the sample to be

studied depending on the nature of the research being conducted; what is expected of the sample and information on the target population available (Lohr, 1999).

Even though many variables are measured in this study, attention was centered on only one response which is whether the student needs financial assistance, and this is for the purpose of estimating the sample size. The response on the need of financial aid is considered for this estimation because it is the main focus of the study. It is worth noting in conducting a survey that precision is a very crucial factor which needs to be considered right at the stage of determining the size of the sample. There is therefore the need to find an equation that relates sample size and expectation of the sample (Lohr, 1999). The desired precision which is often expressed in absolute terms as,

$$P(|\bar{y} - \overline{y_u}|) \leq e) = 1 - \alpha$$

is the simplest equation that relates the sample size and the researcher's expectation of the sample Lohr (1999). This equation comes from the Confidence Interval for mean from a Simple Random Sample, that is

$$\bar{y} \pm Z_{\alpha/2}\, \text{SE}(\bar{y}) \qquad \text{but}$$

$$\text{SE}(\bar{y}) = \sqrt{1 - \frac{n}{N}}\ \frac{S}{\sqrt{n}} \qquad \text{(Lohr, 1999)}$$

To obtain absolute precision e we find a value of n that satisfies

$$e = Z_{\alpha/2}\sqrt{1 - \frac{n}{N}}\ \frac{S}{\sqrt{n}}$$

The vital outcome of this is how precise the estimates are and not the proportion of the population studied. As confirmed by Lohr (2010) that precision is obtained through the absolute value size of the sample and not the proportion of the population covered except for small populations. The only place that the population size occurs is in the finite population correction (fpc) factor in the variance formula of the Confidence Interval formula. The fpc has no effect on the variance of the estimator in larger populations. Since the population size for this study is 19,877 students, which is large, the fpc is ignored in the computation of the sample size using the precision formula.

The formula now becomes $e = Z_{\alpha/2}\frac{S}{\sqrt{n}}$ and

$$n = \frac{Z^2_{\alpha/2}S^2}{e^2}$$

Since the response on the need of financial aid which is in proportions is the focal point of this study and therefore for the purpose of estimating the sample size, the standard error s^2 would be replaced by pq where p and q are the proportions of students who need financial aid and students who don't need financial aid respectively. Therefore,

$$n = \frac{Z^2_{\alpha/2}pq}{e^2}$$

As the proportion of needy students in the population is not known we choose p = 0.5 because according to Lohr (2010) for large populations $S^2 \approx p(1 - p)$ and it attains its maximal value when p = 0.5. The margin of error chosen is e = 0.05 and α = 0.05

Hence, $$n = \frac{(1.96)^2(0.5)(0.5)}{(0.05)^2}$$

$$n \approx 384$$

This sample size was settled on because as earlier said that for large populations the precision is attained not through the proportion of the population studied but the absolute size of the sample. This assertion was confirmed by Cochran (1977) that if the population exceeds 8000, the sampling fraction is less than 5% and no adjustment for fpc is called for.

3.5.2 Sampling Design

The sampling procedure that was used is Simple Random Sampling; the design was achieved by acquiring the identification numbers of all the 19,877 students which served as the sampling frame. The 19,877 Identification numbers were entered into an excel worksheet and used the software was used to generate 384 ID numbers randomly. The 384 randomly selected ID numbers were traced to the corresponding names and departments of the students.

3.6 Data Collection

Since the source of data for the study is primary, it was collected through questionnaire administration. Secondary data was not used because most of the information was not available at the University.

The questionnaires were responded to by students of the various levels of study indicated earlier of which the majority was the level three hundred students and across the course of study more of the Arts and Science students responded very well.

The questionnaire was designed in nine sections (from Section A to Section I) the least number of questions in a section was four, the longest section had twelve questions and on the average there were ten questions in a section. See Appendix B for questionnaire. The questionnaire had both types of items which are open and closed ended questions and the form of administration was self – administration. This form was used because it was a university community and it was presumed that students would understand the questions and answer accordingly without the researcher's assistance and the second reason was budget and time constraint.

In all three hundred and eighty four questionnaires were distributed and three hundred and seventy eighty were returned.

3.7 Method of Data Analysis

This section entails data cleaning and preparation process, description of the data, testing of necessary assumptions, procedures used for the main analysis and discussion of the underlying theories.

3.7.1 Preliminary Analysis

This section of the analysis involves examination of the data; identification of missing data and appropriate remedies to replace them, detection and handling of outliers and testing of the assumptions underlying factor analysis. The descriptive statistics of the data were computed and discussed to enable the researcher have a general overview of the

study sample. These were critical because they helped to gain a basic understanding of the data, to acquire some primary information with regards to the demographics of the sampled population, the relationships between the variables, and also to check if the data to be used for the analysis meet the requirements for the specific analytical tool.

3.7.1.1 Data Cleaning

During this exercise some issues were encountered such as errors in inputting the data; these errors were detected by juxtaposing the data with the questionnaires (each completed questionnaire was cross checked with the data using the questionnaire identification number as the reference point). The errors were duly corrected. Moreover, there were a few problems with the coding of some of the responses which were also changed accordingly.

3.7.1.2 Treatment of Missing Values and Outliers

Examination and replacement of missing data are crucial issues because they could create problems in later data analysis, especially for complex once such as multivariate analysis. There was the need to replace missing data because the analytical tool does not accommodate that. Missing responses represent values of variables that are unknown, either because respondents did not provide answers to those questions or their answers were not properly recorded (Naresh, 2004).

About six questionnaires were discarded due to the fact that the respective respondents did not answer up to fifty percent of the questions. The mean response which is considered as a neutral value was substituted for the missing responses of the questionnaires that were retained. As argued by Naresh (2004) that the mean remains unchanged and other statistics such as correlations are not affected much. There may be a few questions in connection with the logic of substituting a mean for respondents who, if they had answered, might have used either high or low ratings even though this approach has some merits (Naresh, 2004). The modal response was used to replace the missing values of the categorical variables.

There were no clearly observed outliers in the data perhaps due to the nature of the grouping of certain variables. The eighth item of Section F of the questionnaire was not used in the analysis due to the reason that over fifty percent of the respondents did not answer the questions in that section.

3.7.1.3 Description of Data

Tables were basically used to present the descriptive statistics of the data, frequencies were mainly used and a few cross tabulations in describing the nature of the data. This was because the researcher thought the tables depicted more characteristics (total number of respondents, and cumulative percentages) of the data as compared to charts.

3.7.1.4 Testing of Assumptions

There are a few conceptual assumptions which are associated with factor analysis and these issues were discussed before the statistical assumptions were considered.

Conceptual Issues

A basic assumption of factor analysis is that some underlying structure exits in the set of selected variables (Hair, Black, Babin, Anderson and Tathan, 2006). The researcher ensured that the observed patterns were conceptually valid and appropriate to employ factor analysis since the technique has no means of determining appropriateness other than correlations. If there are no patterns, the existence of correlated variables and the subsequent definition of factors do not achieve relevance even if the statistical requirements are met (Hair et al., 2006). This makes the conceptual issues very paramount in this study. Secondly, the sample must be homogeneous with respect to the underlying factor structure (Hair et al., 2006).

With the issue of sample size, Leech, Barret and Morgan (2005) think that sample size is less crucial for factor analysis to the extent that the communalities of items with the other items are high, or at least relatively high and variable. The minimum sample size is 50. Hair et al. (2006) also suggest that the sample size should be preferably 100 or larger and the total response gathered for this study was 372.

Statistical Issues

The normality of the distributions of the variables was checked by computing the skewness and kurtosis statistics. Some degree of intercorrelations among variables or multicollinearity is desirable and this was simply checked by constructing a correlation matrix for the data. Due to the huge nature of the correlation matrix because of a large number of variables, visual inspection (to check if the matrix has considerable number of correlations that are greater than 0.30) was tedious. Therefore, the statistically significant Bartlett's test of sphericity which was to test if sufficient correlation exits among the variables was computed. If the significance value is less than 0.05 it indicates that there is sufficient correlation and we can therefore proceed.

The Kaiser-Meyer-Olkin measure of sample adequacy which is an index used to examine appropriateness of factor analysis was used and a value greater than 0.5 indicates that factor analysis is appropriate for the data.

3.7.2 Factor Analysis

Multivariate statistical technique of factor analysis has experienced increased usage during the past decade in all fields of business-related research and as the number of variables to be considered increases, so does the need for increased knowledge of the structure and interrelationship of the variables (Hair et al., 2006).

Factor analysis is employed in this study because of its ability to examine the underlying patterns or relationships for a large number of variables and to determine whether the information can be condensed or summarized in a smaller set of factors or components. The study has large number of variables used and hence the need to be reduced and summarized for subsequent analysis.

The most important reason of factor analysis is to describe, if possible, the covariance relationship among many variables in terms of underlying, but unobservable, random quantities called factors (Johnson and Wichen, 2007). Empirically, there is an argument that motivates the factor model, and it is as follows: suppose all the variables within a particular group are highly correlated among themselves but relatively small correlations with variables in a different group, then it can be conceived that each group of variables represent a single underlying construct, or factor which is responsible for the observed correlations (Johnson and Wichern, 2007). For example, correlations from a need analysis data, the group of; family owning its dwelling, number of rooms, hectares of land owned by the family, household owning a large scale business, locality of dwelling, building material of dwelling, collected by spearman's correlation suggests an underlying "socio-economic status" factor. A second factor representing type of Junior High and Senior High Schools attended, course of study and guardian's highest qualification might correspond to "educational background" factor.

The unique factors must be uncorrelated with each other and with common factors. The common factors themselves can be expressed as linear combinations of the variables of a few random variables $f_1, f_2, \ldots, f_m$ ($m<p$) called factors (Johnson and Wichern, 2007), where p is the number of variables. The factors represent the underlying dimensions (constructs) that summarize or account for the original set of observed variables ($x_1, x_2,...,x_p$). Like the original variables, the factors vary on individual basis; but unlike the variables, the factors cannot be measured or observed (Johnson and Wichern, 2007).

If the original variables $x_1, x_2, \ldots, x_p$ are at least moderately correlated, the basic dimensionality of the system is less than p (Rencher, 2002). Suppose the pattern of the high and low correlations in the correlation matrix is such that the variables in a particular subject have high correlations among themselves but low correlations with all other variables (Rencher, 2000). Then there may be a single underlying factor that gave rise to the variables in the subject and hence if the other variables can similarly be grouped into subjects with a like pattern of correlations, then a few factors can represent these groups of variables (Rencher, 2000). Thus, the pattern in the correlation matrix may correspond directly to the factors. For example, suppose the correlation matrix has the form

$$\begin{bmatrix} 1 & 0.9 & 0.05 & 0.05 & 0.05 \\ 0.9 & 1 & 0.05 & 0.05 & 0.05 \\ 0.05 & 0.05 & 1 & 0.9 & 0.9 \\ 0.05 & 0.05 & 0.9 & 1 & 0.9 \\ 0.05 & 0.05 & 0.9 & 0.9 & 1 \end{bmatrix}.$$

The variables 1 and 2 correspond to a factor and variables 3, 4 and 5 correspond to another factor (Rencher, 2000). “In some cases where the correlation matrix does not

have such a simple pattern, factor analysis will still partition the variables into clusters" (Rencher, 2000).

3.7.2.1 The Orthogonal Factor Model

Suppose the observations made on each of the randomly selected students from a homogeneous population (University of Ghana) is a value of the random vector

$\underset{\sim}{X} = (x_1, x_2, \ldots, x_p)'$ with mean vector $\underset{\sim}{\mu} = (\mu_1, \mu_2, \ldots, \mu_3)'$ and covariance matrix $\underset{\sim}{\sum}$. Then the factor model postulates that X is linearly dependent on a few unobservable random variables $F_1, F_2, \ldots, F_m$ called common factors, and p additional sources of variation $\varepsilon_1, \varepsilon_2, \ldots, \varepsilon_p$, called errors or sometimes specific factors (Johnson and Wichern, 2007). The factor analysis model is

$$
\begin{aligned}
x_1 - \mu_1 &= l_{11}f_1 + l_{12}f_2 + \ldots + l_{1m}f_m + \varepsilon_1 \\
x_2 - \mu_2 &= l_{21}f_1 + l_{22}f_2 + \ldots + l_{2m}f_m + \varepsilon_2 \\
&\vdots \\
x_i - \mu_i &= l_{i1}f_{i1} + l_{i2}f_2 + \ldots + l_{im}f_m + \varepsilon_i \\
&\vdots \\
x_p - \mu_p &= l_{p1}f_1 + l_{p2}f_2 + \ldots + l_{pm}f_m + \varepsilon_p
\end{aligned}
\qquad (1)
$$

The coefficient l_{ij} is called the loading of the i^{th} variable on the j^{th} factor so the matrix L is the matrix of factor loadings. The i^{th} specific error is associated with the i^{th} response x_i. The p deviations $x_1 - \mu_1, x_2 - \mu_2, \ldots, x_p - \mu_p$ are expressed in terms of p + m random variables $F_1, F_2, \ldots, F_m, \varepsilon_1, \varepsilon_2, \ldots, \varepsilon_p$ which are unobservable. With so many unobservable quantities (factors), a direct verification of the factor model from the observations on $x_1, x_2, \ldots, x_p$ is futile (Johnson and Wichern, 2007).

For us to achieve a parsimonious description of the variables as functions of a few underlying factors, m should be substantially smaller than p, otherwise we have not attained parsimony.

The orthogonal factor model (1) can be written in a matrix notation as follows:

$$\underset{(p \times 1)}{X - \mu} = \underset{(p \times m)}{L} \underset{(m \times 1)}{F} + \underset{(p \times 1)}{\varepsilon} \qquad (2)$$

Where $\underset{\sim}{X}$ and $\underset{\sim}{\mu}$ are as previously defined,

$$\underset{\sim}{L} = \begin{bmatrix} l_{11} & l_{12} & \cdots & l_{1m} \\ l_{21} & l_{22} & \cdots & l_{2m} \\ \vdots & \vdots & & \vdots \\ l_{p1} & l_{p2} & \cdots & l_{pm} \end{bmatrix}, \underset{\sim}{F} = (f_1, f_2, \ldots f_p)' \quad \text{and} \quad \underset{\sim}{\varepsilon} = (\varepsilon_1, \varepsilon_2, \ldots \varepsilon_p)'$$

However, with some additional assumptions about the random variables F and Ɛ, the model implies certain covariance relationships can be checked (Johnson and Wichern, 2007).

$$E(F) = \underset{(m \times 1)'}{0} \qquad Cov(F) = E(FF') = \underset{(m \times m)}{I}$$

$$E(\varepsilon) = 0 \qquad cov(\varepsilon) = E(\varepsilon\,\varepsilon') = \psi = \begin{bmatrix} \psi_1 & 0 & \ldots & 0 \\ 0 & \psi_2 & \ldots & 0 \\ \vdots & & \ddots & \vdots \\ 0 & 0 & \ldots & \psi_p \end{bmatrix}$$

These assumptions and the relation in (2) above constitutes the orthogonal factor model

3.7.2.2 Method of Estimating Factor Loadings

Given observations $x_1, x_2, \ldots, x_n$ on p generally correlated variables, factor analysis seeks to answer the question, does the factor model

$$X - \mu = L F + \varepsilon \qquad (3)$$

with small number of factors, adequately fit the data? In essence we tackle this statistical modelling problem by trying to verify the covariance relationship in equation (3). If the

off-diagonal elements of the sample covariance matrix S (which is an estimator of the population covariance matrix $\sum$) are smaller or those of the sample correlation matrix R are essentially zero, the variables are not related and factor analysis will not prove useful (Johnson and Wichern, 2007). In these circumstances, the major aim of factor analysis which is to determine a few important common factors is not achieved because the specific factors play the dominant role. If $\sum$ appears to deviate significantly from a diagonal matrix, then a factor model can be entertained, and the initial problem is estimating the factor loadings l_{ij} and specific variance ψ (Johnson and Wichern, 2007).

This study considered one of the two popular methods of estimating the factor loadings which are the Principal Component Method, and the Maximum Likelihood Estimation Method. The principal component method was chosen because it does not make strong distributional assumptions. Normality is important only to the extent that skewness or outliers affect the observed correlations or if significance tests are performed, it is based on correlations. Independent sampling is required and the variables should be related to each other (in pairs) in a linear fashion. Finally many of the variables should be correlated at a moderate level (Leech, Barrett and Morgan, 2005). While the Maximum Likelihood Estimation method requires multivariate normality implying that the variables must be normally distributed and the joint distribution of all the variables should be normal (Leech et al., 2005). The data obtained for this study do not meet these conditions, so the researcher resorted to the use of the former approach, i.e., the Principal Component method.

3.7.2.3 The Principal Component Method

Let $\sum$ have eigenvalue – eigenvector pairs (λ_j, e_j) with $\lambda_1 \geq \lambda_2 \geq \ldots \geq \lambda_p \geq 0$.

Then $\sum$ can be decomposed as a linear combination of the eigen value – eigen vector pairs as follows:

$$\sum = \lambda_1 e_1 e_1' + \lambda_2 e_2 e_2' + \ldots + \lambda_p e_p e_p'$$

$$= \left[\sqrt{\boldsymbol{\lambda_1}}\mathbf{e_1} \quad \sqrt{\boldsymbol{\lambda_2}}\mathbf{e_2} \quad \ldots \quad \sqrt{\boldsymbol{\lambda_p}}\mathbf{e_p}\right] \begin{bmatrix} \sqrt{\boldsymbol{\lambda_1}}e_1' \\ \sqrt{\boldsymbol{\lambda_2}}e_2' \\ \vdots \\ \sqrt{\boldsymbol{\lambda_p}}e_p' \end{bmatrix} \qquad (4)$$

This fits the prescribed covariance structure for the factor analysis model having as many factors as variables (m = p) and specific variance $\psi_i = 0$ for all i. The loading matrix has j^{th} column given by $\sqrt{\lambda_i} e_i$.

That is we can write $\underset{(pxp)}{\sum} = \underset{(pxp)}{L} \underset{(pxp)}{L'} + \underset{(pxp)}{0} = L L' \qquad (5)$

Apart from the scale factor $\sqrt{\lambda_j}$, the factor loadings on the factor are the coefficients of the j^{th} principal components of the population.

Although the factor analysis representation in (5) is exact, it is not particularly useful because it employs as many common factors as there are variables and does not allow for any variation in the specific factors Ɛ in $X = \mu + L F + Ɛ$ (Johnson and Wichern, 2007). We thus prefer models that explain the covariance structure in terms of just a few common factors. One approximation, when the last p-m eigenvalues are small, is to neglect the contribution of

$\lambda_{m+1} e_{m+1} e_{m+1}' + \ldots + \lambda_p e_p e_p'$ to $\sum$ in (4). Neglecting this contribution, we obtain the approximation

$$\left[\sqrt{\lambda_1}e_1 \quad \sqrt{\lambda_2}e_2 \quad \ldots \quad \sqrt{\lambda_m}e_m\right] \begin{bmatrix} \sqrt{\lambda_1}\, e_1' \\ \sqrt{\lambda_1}\, e_2' \\ \vdots \\ \sqrt{\lambda_m}e_m' \end{bmatrix} = L\, L' \qquad (6)$$

The approximation in (6) assumes that the specific error factor in (3) are of minor importance and can be ignored in the factoring of ∑. If specific factors are included in the model, their variances may be the diagonal elements of Ɛ (Johnson and Wichern, 2007).

After obtaining the factor loadings (which represent the correlation between an original variable and its factor (Hair et al., 2006)) by using the Principal Component Method of estimation which is based on eigenvalues, a matrix of factor loadings is formed. This matrix contains the factor loading of each variable on each factor. The researcher used the rotated factor loading matrix because rotated factor loadings give a better understanding of the components than the unrotated results.

3.7.2.4 Factor Rotation

Extracted factors were rotated because the rotated results facilitated interpretation and gave a better understanding of the components. The method of orthogonal rotation used is the varimax which has the objective to determine the transformation matrix, C (with order p X m), such that any given factor will have some variables load very high on it and some that will load very low on it (Sharma, 1996). This is achieved by maximizing the variance of the squared loading across variables, subject to the constraint that the communality of each variable is unchanged. That is for a given factor

$$V_j = \frac{\sum_{i=1}^{p}\left(l_{ij}^2 - l_j^2\right)^2}{p}$$

$$= \frac{p\sum_{i=1}^{p} l_{ij}^4 - \left(\sum_{i=1}^{p} l_{ij}^2\right)^2}{p^2} \qquad (7)$$

where V_j is the variance of the communalities of the variables within factor j and l_j^2 is the average squared loading for factor j. The total variance for all the factors is then given by

$$V = \sum_{j=1}^{m} V_j$$

$$= \sum_{j=1}^{m} \left(\frac{p\sum_{i=1}^{p} l_{ij}^4 - \left(\sum_{i=1}^{p} l_{ij}^2\right)^2}{p^2} \right)$$

$$= \frac{\sum_{j=1}^{m}\sum_{i=1}^{p} l_{ij}^4}{p} - \frac{\sum_{j=1}^{m}\left(\sum_{i=1}^{p} l_{ij}^2\right)^2}{p^2}$$

Since the number of variables remains the same, maximizing the preceding equation is the same as maximizing

$$\text{pv} = \sum_{j=1}^{m}\sum_{i=1}^{p} l_{ij}^4 - \frac{\sum_{j}^{m}\left(\sum_{j=1}^{p} l_{ij}^2\right)^2}{p} \qquad (9)$$

The orthogonal matrix, C, is obtained such that (3) is maximized, subject to the constraint that the communality of each variable remains the same.

3.7.2.5 Computation of factor scores

Factor scores are composite measures of each factor computed for each subject and conceptually the factor score represent the degree to which each respondent scored high on the group of items with high factor loadings (Hair et al., 2006). Thus, high values on the variables with high loadings on a factor will result in a higher factor score (Hair et al., 2006).

There is a paramount characteristic that differentiates the factor from a summated scale and single surrogate variable and that is, the factor score is computed based on the factor loadings of all variables on the factor, whiles the summated scale is calculated by combing only selected variables (Hair et al., 2006). Therefore, although the researcher is able to characterize a factor by the variable with the highest loading, consideration was also given to the lower loadings and their influence on the factor score.

Advantages of this method of representation are that all variables loading on the factor are represented and it is the best method for complete data reduction, secondly, they are by default orthogonal and can avoid complications caused by multicollinearity (Hair et al., 2006). Disadvantages; interpretation is more difficult because all variables contribute through loadings and also difficult to replicate across studies (Hair et al. 2006).

Computational Formula

The factor scores are estimates of the common factors and there are different techniques for estimating them (Joshnson and Wichern, 2007). Multiple regression is one of the techniques that has been used to estimate the factor score coefficients (Sharma, 1996).

The factor score for individual i on a given j can be represented by

$$\hat{f}_{ij} = \hat{\beta}_1 x_{i1} + \hat{\beta}_2 x_{i2} + \ldots + \hat{\beta}_p x_{ip} \qquad (10)$$

where $\hat{f}_{ij}$ is the estimated factor score for factor j for individual i, $\hat{\beta}_p$ is the estimated factor score coefficient for variable p, and x_{ip} is the p^{th} observed variable for individual i (Sharma,1996). This equation can be represented in matrix form as

$$\hat{f} = X\hat{B}, \qquad (11)$$

where $\hat{f}$ is an n x m matrix of m factor scores for the n individuals, X is an n x p matrix of observed variables, and $\hat{B}$ is a p x m matrix of estimated factor score coefficient (Sharma, 1996). For standardised variables

$$\hat{f} = Z\hat{B}, \qquad (12)$$

Equation (12) can be written as

$$\frac{1}{n}Z'\hat{f} = \frac{1}{n}Z'Z\,\hat{B} \qquad (13)$$

or $\Lambda = R\hat{B}$

as $\frac{1}{n}(Z'Z) = R$ and $\frac{1}{n}Z'\hat{f} = \Lambda$. (Sharma, 1996)

Therefore, the estimated factor score coefficient matrix is given by

$$\hat{B} = R^{-1}\Lambda \qquad (14)$$

And the estimated factor scores by

$$\hat{f} = ZR^{-1}\Lambda \qquad (15)$$

From equation (15), it should be noted that the estimated factor score is a function of the original standardised variables and the loading matrix (Sharma, 1996).

3.7.2.6 Computation of Relative Need Index (RNI)

The relative need index was computed based on the factor scores estimated for each respondent. All the 22 factor scores computed for every individual were summed up and the total score constituted the Relative Need Index Nortey, 2012). The level of each respondent's need has been quantified, besides, some of the need levels were negative values. Using the formula

$$\mathbf{RNI_{adj}} = \frac{(Score - minimum)}{maximum - minimum}\ x\ 100$$

score = the aggregate factor score of a respondent for all respondents

maximum = the maximum value of the aggregated scores for all respondents

minimum = the minimum value of the aggregated scores

the adjusted RNI had to be computed in order to eliminate the negative values and also normed the need levels from zero 0% to 100% using the formula **(**Nortey, 2012)

The students were then categorised into five groups according to the level of their need and the grouping were as follows:

Group	RNI Score (%)	Need Category
1	80 – 100	Most needy
2	60 – 79.99	Moderately needy
3	40 – 59.99	Needy
4	20 – 39.99	Less needy
5	0 - 19.99	Least needy

3.8 Model Validation

Model validation was conducted to check the validity of the findings made from the analysis using the split sample validation. This option was chosen by the researcher because it is less expensive and time saving as compared to the option where another study is conducted in the same population to validate the findings.

The sample was divided randomly into two parts and factor analysis was performed on each half. The two results were compared to each other and also to the result from the full dataset. It was observed that the communalities and the factor loadings for each half and the full dataset were almost the same. This established the generalizability and validity of the findings because the two separate analyses depicted a replication in the data.

Since the comparison was based on patterns and not exact results, our conclusion was based on the pattern of the factor loadings and the communalities. All the communalities were above 0.5 and the factor loading patterns were almost the same. Even though some of the variables changed the components on which they loaded and the signs of some of the loadings also changed (ie from positive to negative or vice versa), these did not alter the validity of the findings.

3.9 Ethical Issues

All references used during the study were duly acknowledged. Respondents were assured of the confidentiality of the information they provided and they were also made to know that the research was for academic purpose.

3.10 Challenges

There were a few challenges during the field work. The students were unwilling to cooperate and among the ones who complied some complained about the length of the questionnaire and the sensitivity of the questions.

CHAPTER FOUR

RESULTS OF DATA ANALYSIS

4.1 Introduction

This chapter thoroughly explores, analyses and reports the data solicited from sampled respondents in assessing the need levels of the University of Ghana students and in building a statistical model that engenders the significant factors that differentiates needy students from non-needy students. The chapter is in three sections, the first section presents the results of preliminary analysis followed by presentation of the main analysis and the final section discusses the results of both analysis. All tables and charts are outputs from SPSS (version 18.0) which was employed for the analysis.

4.2 Presentation of Preliminary Analysis of the Data

This section submits the results of the descriptive statistics of the data with basically frequency tables showing percentages of respondents under the various variables.

4.2.1 Demographic Description of the Sample

The results presented in this subsection describes the demographic characteristics of the respondents, including Gender, Age, Region and Locality respondents hailed from and where they permanently reside.

4.2.1.1 Gender of Respondents

The analysis of the study depicted that out of the 372 students who participated, majority (267) constituting 72% of the total number were males and 28% were females as displayed in Table 4.2.1.1.

Table 4.2.1.1 Gender of Respondents

Gender	Frequency	Percent	Cumulative Percent
Male	267	71.8	71.8
Female	105	28.2	100.0
Total	372	100.0	

Source: Field data, 2013

4.2.1.2 Age Distribution of Respondents

The most represented age in the age distribution was 22years which forms 27.4% of the total number of students enumerated, as delineated in Table 4.2.1.2. The second highest was 18 years and that constituted 18.3%, the third and fourth highest were 23 years and 20 years and they represented 12.6% and 11.6% respectively. The least represented ages were 17 years, 31 years, 32 years, 33 years and 34 years which were represented by 5% each. On the other hand, ages 18 and 28 years were not represented in the distribution, meanwhile, the youngest students in the sample were 17 years and the oldest were 36 years.

Table 4.2.1.2 Age Distribution of Respondents

Age	Frequency	Percent	Cumulative Percent
17	2	0.5	0.5
19	24	6.5	7.0
20	43	11.6	18.5
21	68	18.3	36.8
22	102	27.4	64.2
23	47	12.6	76.9
24	26	7.0	83.9
25	18	4.8	88.7
26	13	3.5	92.2
27	3	0.8	93.0
29	4	1.1	94.1
30	8	2.2	96.2
31	2	0.5	96.8
32	2	0.5	97.3
33	2	0.5	97.8
34	2	0.5	98.4
35	3	0.8	99.2
36	3	0.8	100.0
Total	372	100.0	

Source: Field data, 2013

4.2.1.3 Respondent's Region Hailed from and Permanent Region of Residence

Majority of the students hailed from the Eastern Region which recorded 21.5%, and 29 respondents forming 7.8% of the total respondents resided in that region. Volta Region recorded 20.7% with 77 respondents and 4.8% with 18 respondents who hailed from, and resided in her respectively as shown in Table 4.2.1.3.

Table 4.2.1.3 Region Respondents Hailed from and Permanent Region of Residence

Region	Hailed From		Permanent Residence	
	Frequency	Percent	Frequency	Percent
Western	32	8.6	13	3.5
Central	38	10.2	24	6.5
Greater Accra	54	14.5	213	57.3
Volta	77	20.7	18	4.8
Eastern	80	21.5	29	7.8
Ashanti	51	13.7	46	12.4
Brong Ahafo	13	3.5	4	1.1
Northern	10	2.7	14	3.8
Upper East	9	2.4	7	1.9
Upper West	8	2.2	4	1.1
Total	372	100.0	372	100.0

Source: Field data, 2013

Even though the Greater Accra Region recorded the third highest of region respondents hailed from, with 14.5% of the total number of respondents, an overwhelming majority (213 out of

the 372 respondents) constituting 57.3% resided in the region as delineated in Table 4.2.1.3. This indicated that many of the respondents who hailed from the other nine regions permanently resided in the Greater Accra Region. Moreover, 51 respondents forming 13.7% hailed from the Ashanti Region while 12.4% permanently resided there.

Furthermore, the Central and the Western Regions were moderately represented with 38 and 32 respondents respectively having their home towns in those two regions. Out of the 372 respondents 24 and 13 permanently resided in the Central and the Westerns regions respectively. The Brong Ahafo and the three Northern Regions were the least represented regions in the study with the Upper West recording the smallest figure (of region respondents hailed from) which is eight and it formed 2.2% of the entire respondents. The Northern Region had a higher number of respondents (14 making 3.8% of the total number of respondents) who permanently resided in her than the number (10) of respondents who hailed from her.

4.2.1.4 Localities Respondents Hailed from and Permanently Resided

It is shown in Table 4.2.1.4 that a little over half (51.1%) of the respondents had their permanent places of residence located in urban centers, while 133 (35.8%) of them resided in Regional Capitals and the rest of the 13.25 also resided in rural areas.

It was evident in Table 4.2.1.4 that a little below half of the respondents have their home towns in urban areas (45.4%) and as many as 115 respondents which is about 31% hailed from rural communities. It is only a small proportion which is 23.7% that hailed from regional capitals.

Table 4.2.1.4 Respondents' Permanent Locality of Residence and Locality Hailed from

	Permanent Residence		Hailed From	
Locality	Frequency	Percent	Frequency	Percent
Regional Capital	133	35.8	88	23.7
Urban	190	51.1	169	45.4
Rural	49	13.2	115	30.9
Total	372	100.0	372	100.0

Source: Field data, 2013

4.2.2 Respondent's Student Status

The items presented are level and course of study, class attained and residential status of students who participated in the study.

4.2.2.1 Respondent's Level of Study

From Table 4.2.2.1 it can be observed that 140 (37.6%) out of the 372 respondents were in level 300 as at the time the study was conducted. Levels 200 and 400 were surprisingly equally represented in the selected sample contributing 31.2% each.

4.2.2.1 Level of Study

Level	Frequency	Percent	Cumulative Percent
200	116	31.2	31.2
300	140	37.6	68.8
400	116	31.2	100.0
Total	372	100.0	

Source: Field data, 2013

4.2.2.2 Course of Study and Performance of Respondent

From Table 4.2.2.2 it can be observed that 182 respondents representing 50.7% were Arts students, followed by science students who formed 30.1% (108 respondents), respondents who offered business were 67, representing 18.7% while only 0.6% were offering Fine Arts.

It could be observed that majority (224) representing 62.4% of the students fell in the second class lower division, while 15.9% were in the second class upper category, the first class and the third class divisions recorded 10.9% each.

In all the courses of study, apart from Fine Arts, majority of the respondents were in the second class lower division, that is Science – 74.1%, Arts – 56.6%, Business – 61.2% and the only two respondents who were Fine Arts students were in the third class division. The researcher attributed this to the wide range of the second class lower division. It can be deduced from Table 4.2.2.2 that the course of study that recorded the highest

percentage point of first class students was Business, that is, 20.9% of the total number of Business students was in the first class division. Only 4.6% and 11% of Science and Arts students respectively fell in the first class division.

Tables 4.2.2.2 Course of study by Performance Class of Respondents

			Performance Class				
			First Class	Second Upper	Second Lower	Third Class	Total
Course of study	Science	Count	5	12	80	11	108
		% within Course of study?	4.6%	11.1%	74.1	10.2%	100%
	Arts	Count	20	33	103	26	182
		% within Course of study	11.0%	18.1%	56.6%	14.3%	100%
	Business	Count	14	12	41	0	67
		% within Course of study	20.9%	17.9%	61.2%	0%	100%
	Fine Arts	Count	0	0	0	2	2
		% within Course of study	.0%	.0%	0%	100%	100%
Total		Count	39	57	224	39	359
		% within Course of study	10.9%	15.9%	62.4%	10.9%	100%

Source: Field Data, 2013

4.2.2.3 **Residential Status of Respondent**

With reference to Table 4.2.2.3 it can be observed that about two - thirds (65.1%) of the respondents were resident and the other proportion of the students were non-resident.

4.2.2.3 Residential Status

Residential Status	Frequency	Percent	Cumulative Percent
Resident	242	65.1	65.1
Non-resident	130	34.9	100.0
Total	372	100.0	

Source: Field data, 2013

4.2.2.4 **Type of Accommodation of Non-Resident Respondents**

It can be deduced from Table 4.2.2.4 that out of 130 non-resident students 45 representing 34.6% of the non-resident students lived with their families or relatives in town, 23.8% of the non-resident students lived in hostels in town.

4.2.2.4 Type of Accommodation of Non-Residence Respondents

Accommodation Type	Frequency	Percent	Cumulative Percent
SNNIT Flat/Private Hostel on campus	28	21.5	21.5
Hostel in town	31	23.9	45.4
Rented private homes	26	20	65.4
Family/Relative in Town	45	34.6	100.0
Total	130	100	

Source: Field data, 2013

Furthermore, 21.5% and 20% of non-resident students lived in either SSNIT flats or private hostels on campus and rented private homes respectively.

4.2.3 Information on Respondents Educational Background

The factors grouped under this sub – section are the highest qualification attained by respondent, ownership, locations of JHS and SHS attended and then sponsors of their education from primary school to the time of the study.

4.2.3.1 Respondent's Highest Education Qualification Attained

As delineated in Table 4.2.3.1 a chunk of the respondents thus (343 out of 372) representing 92.2% had SHS, SSS or O'Level as their highest qualification ever attained. The other 7.9% had their highest qualification in A' Level, Diploma, Training College and Technical/Professional categories.

Table 4.2.3.1 Respondent's Highest Education Qualification Attained

Qualification	Frequency	Percent	Cumulative Percent
SHS/SSS/O' Level	343	92.2	92.2
A' Level	4	1.1	93.3
Diploma	8	2.2	95.4
Training College	11	3.0	98.4
Tech/Professional	6	1.6	100.0
Total	372	100.0	

Source: Field data, 2013

4.2.3.2 Type of SHS and JHS

Almost all (96.2%) of the respondents attended public Secondary Schools as portrayed in Table 4.2.3.2. Furthermore, a little more than half, that is 202 out 372 (54.3%) of the respondents attended public Junior High Schools and 45.7% attended private Junior High Schools.

Table 4.2.3.2 Type of SHS and JHS

	SHS		JHS	
Ownership	Frequency	Percent	Frequency	Percent
Public	358	96.2	170	45.7
Private	14	3.8	202	54.3
Total	372	100.0	372	100.0

Source: Field data, 2013

4.2.3.3 Locality of SHS and JHS Attended

Considering the locality of SHS attended by the respondents, out of 372, 213 representing 57.3% attended Senior High Schools located in regional capitals and the remaining 42.8% attended urban and rural secondary schools as displayed in Table 4.2.3.3.

More than half (54.8%) of the respondents attended their JHS in the cities across the ten regions in Ghana as portrayed in Table 4.2.3.3. While 121 (32.5%) out of the 372 attended their JHS in urban areas and the remaining 12.6 % had their basic education in the rural communities.

Table 4.2.3.3 Locality of SHS and JHS Attended

	SHS		JHS	
Locality	Frequency	Percent	Frequency	Percent
City	213	57.3	204	54.8
Urban	117	31.5	121	32.5
Rural	42	11.3	47	12.6
Total	372	100.0	372	100.0

Source: Field data, 2013

4.2.3.4 Sponsor of Respondents' Primary/JHS Education

The basic education of almost all (96.8%) of the respondents was sponsored by their parents as portrayed in Table 4.2.3.4. Only 12 students (representing 3.3%) out of the 372 respondents had their basic education sponsored by their guardians and other family members.

Table 4.2.3.4 Sponsor of Respondents' Primary/JHS Education

Sponsor	Frequency	Percent	Cumulative Percent
Parent	360	96.8	96.8
Guardian	8	2.2	98.9
Other Family Member	4	1.1	100.0
Total	372	100.0	

Source: Field data, 2013

4.2.3.5 Sponsor of Respondents' Secondary Education

It can be observed that majority (83.1%) of the respondents were seen through their secondary education by their parents as depicted in Table 4.2.3.5 and the other 16.9% had their secondary education being sponsored by their other family members, their guardians, scholarships and bursaries.

Table 4.2.3.5 Sponsor of Respondents' Secondary Education

Sponsor	Frequency	Percent	Cumulative Percent
Parent	309	83.1	83.1
Guardian	19	5.1	88.2
Scholarship	19	5.1	93.3
Bursaries	4	1.1	94.4
Other Family Member	21	5.6	100.0
Total	372	100.0	100.0

Source: Field data, 2013

4.2.3.6 Main Source of Funding for this Academic Year

The academic year in which the study was conducted, the main sponsor for most (85.2%) of the students were their parents as shown in Table 4.2.3.6. A few respondents (5.6%) saw themselves through the academic year and 9.1% had their main sponsorship from scholarships and bursaries, other family members and study leave with pay.

Table 4.2.3.6 Main Source of Funding for this Academic Year

Sponsor	Frequency	Percent	Cumulative Percent
Parents/Guardian	317	85.2	85.2
Study Leave	2	0.5	85.8
Scholarship/Bursary	18	4.8	90.6
Other Family Member	14	3.8	94.4
Self	21	5.6	100.0
Total	372	100.0	

Source: Field data, 2013

4.2.3.7 All Other Sources of Funding this Academic Year

As clearly depicted in Table 4.2.3.7, it can be seen that out of 372 respondents 352 (94.6%) said they depended on SLTF loan as another source of sponsorship aside their main sponsor.

It was only about 10% of the respondents who had themselves as the other source of funding in the present academic year; this is also portrayed in Table 4.2.3.7.

The number of respondents who had their parents/guardians as their other source of funding apart from their main sponsor was 44 (representing 11.8%).

Table 4.2.3.7 All Other Sources of Funding this Academic Year

	Frequency					
	Yes	No	%Yes	%No	Total	%Total
SLTF	352	20	94.6	5.4	372	100
Self	37	335	9.9	90.1	372	100
Parent/Guardian	44	328	11.8	88.2	372	100
Bursary/Scholarship/Fellowship	20	352	5.4	94.6	372	100
District Assembly	5	367	1.3	98.7	372	100
Educational Fund of Traditional Area	6	366	1.6	98.4	372	100
Other Family Members	44	328	11.8	88.2	372	100
Study Leave	5	367	1.3	98.7	372	100
Others	139	233	37.4	62.6	372	100

Source: Field data, 2013

4.2.4 Respondent's Parent's Status

This section presents parents of the respondents who are alive, employment status and occupation of parents.

4.2.4.1 Respondent's Parents Alive

As portrayed in Table 4.2.4.1 it can be observed that majority (76.1%) of the respondents had both parents alive while 14.85% and 5.1% of the respondents had their mothers only and their fathers only alive respectively. A few (15 respondents constituting 4%) of the total number of respondents were orphans.

Table 4.2.4.1 Respondent's Parents Alive

Parent Alive	Frequency	Percent	Cumulative Percent
Both	283	76.1	76.1
Father	19	5.1	81.2
Mother	55	14.8	96.0
None	15	4.0	100.0
Total	372	100.0	

Source: Field data, 2013

4.2.4.2 Employment Status of Parents

Out of the 363 respondents 318 representing 87.6% of the students' fathers were employed. It is depicted in Table 4.2.4.2 that respondents whose mothers were employed were 255(representing 69.8%).

The total frequency for father and that of mother were not up to the total number of respondents which was 372. This was due to the fact that some of the respondents' parents were not alive as reported in the previous section.

Table 4.2.4.2 Employment Status of Parents

	Father		Mother	
Employment Status	Frequency	Percent	Frequency	Percent
Employed	318	87.6	255	69.8
Unemployed	45	12.4	111	30.3
Total	363	100.0	366	100.0

Source: Field data, 2013

4.2.4.3 Occupation of Father

As shown in Table 4.2.4.5, highest occupation recorded for fathers was Business Man/ Trader which is 33.1% of the total number of respondents. Almost 24% of the fathers were either Public or Civil Servants and 9.4% were teachers. The rest of the fathers were Lecturers, Industry Persons, Commercial Drivers and Farmers.

Table 4.2.4.3 Occupation of Father

Occupation	Frequency	Percent	Cumulative Percent
Business/Trader	123	39.8	39.8
Fisherman/Farmer	24	7.8	47.6
Commercial Driver	8	2.6	50.2
Teacher	35	11.3	61.5
Lecturer	6	1.9	63.4
Public/Civil Servant	88	28.5	91.9
Industry Person	25	8.1	100.0
Total	309	100	

Source: Field data, 2013

4.2.4.4 Occupation of Mother

Majority (42.5% of the total number of respondents) of the mothers were Business Women or Traders, 47 out the 372 respondents have their mothers being Public Servants.

27% of the mothers were farmers or fishmongers, Industry Persons and Teachers as shown in Table 4.2.4.4.

Table 4.2.4.4 Occupation of Mother

Occupation	Frequency	Percent	Cumulative Percent
Business/Trader	158	51.6	51.6
Fisherman/Farmer	36	11.8	63.4
Teacher	31	10.1	73.5
Public/Civil Servant	47	15.4	88.9
Industry Person	34	11.1	100.0
Total	306	100.0	

Source: Field data, 2013

4.2.5 Respondents Socio-economic Status

The researcher reported on various factors such as, marital and employment status of the respondent, respondents' number of children, type of dwelling and facilities in the houses they permanently reside.

4.2.5.1 Marital Status of Respondents

The chunk of the respondents, thus 354 (representing 95.2%) were never married as at the time the questionnaire was administered as portrayed in Table 4.2.5.1. The remaining 4.9% were married and in informal or loose union.

Table 4.2.5.1 Marital Status of Respondents

Marital Status	Frequency	Percent	Cumulative Percent
Married	8	2.2	2.2
Informal/loose Union	10	2.7	4.8
Never Married	354	95.2	100.0
Total	372	100.0	

Source: Field data, 2013

4.2.5.2 Number of Children of Respondents

Almost all of the respondents (97.8%) had no child as can be seen in Table 4.2.5.2, it was only a little proportion (2.1%) which had at most two children.

Table 4.2.5.2 Number of Children of Respondents

Number of Children	Frequency	Percent	Cumulative Percent
0	364	97.8	97.8
1	2	0.5	98.4
2	6	1.6	100.0
Total	372	100.0	

Source: Field data, 2013

4.2.5.3 Employment Status of Respondents

Table 4.2.5.3 sets out that, out of the 372 respondents 353 which forms 94.9% of the total were unemployed, 5.1% were employed.

Table 4.2.5.3 Employment Status of Respondents

Employment Status	Frequency	Percent	Cumulative Percent
Employed	12	3.2	3.2
Employed on study leave without pay	7	1.9	5.1
Unemployed	353	94.9	100.0
Total	372	100.0	

Source: Field data, 2013

4.2.5.4 Material of the Roof of Dwelling

About a half (51.1%) of the respondents' houses were roofed with metal sheets as in Table 4.2.5.4, roofing tiles and asbestos/slate was used to roof the same number of respondents' houses which was 55 (14.8%) each. The least used roofing material was thatch which was used by three out of the 372 students.

Table 4.2.5.4 Material of the Roof of Dwelling

Roofing Material	Frequency	Percent	Cumulative Percent
Roofing tiles	55	14.8	14.8
Cement/concrete	51	13.7	28.5
Metal Sheets	190	51.1	79.6
Asbestos/Slate	55	14.8	94.4
Wood	6	1.6	96.0
Thatch	3	0.8	96.8
Mud	12	3.2	100.0
Total	372	100.0	

Source: Field data, 2013

4.2.5.5 Material of the Walls of Dwelling

As shown in Table 4.2.5.5 the walls of the houses of majority (85.5%) of the respondents were made of cement or sandcrete and, 6.5% have walls of their houses made of mud/mud bricks. Other materials such as burnt bricks, iron sheets, stones and wood/bamboo were used for the walls of the houses of the rest of the respondents.

Table 4.2.5.5 Material of the Walls of Dwelling

Material	Frequency	Percent	Cumulative Percent
Stone	4	1.1	1.1
Burnt bricks	16	4.3	5.4
Cement/sandcrete	318	85.5	90.9
Wood/bamboo	6	1.6	92.5
Iron sheets	4	1.1	93.5
Mud/mud bricks	24	6.5	100.0
Total	372	100.0	

Source: Field data, 2013

4.2.5.6 Source of Drinking Water

Table 4.2.5.6 depicts that more than half (57.5%) of the respondents had pipe borne water running through their homes while 76 out of the 372 respondents buy water from public outdoor pipes. Moreover, as 9.7% depended on bore hole as their main source of water 6.2% also buy their water from vendors or trucks. On the other hand the remaining 6.2% of the respondents depended on protected well, unprotected well or rain water and river, lake or pond as their main source of water.

Table 4.2.5.6 Source of Drinking Water

Water Source	Frequency	Percent	Cumulative Percent
Piped into dwelling or compound	214	57.5	57.5
Vendor or truck	23	6.2	63.7
Public outdoor tap	76	20.4	84.1
Bore Hole	36	9.7	93.8
Protected well	14	3.8	97.6
Unprotected well, rain water	7	1.9	99.5
River, lake, pond	2	0.5	100.0
Total	372	100.0	

Source: Field data, 2013

4.2.5.7 Toilet Facility used by Household

Majority (61.6%) of the respondents used flush toilets in their homes as can be seen in Table 4.2.5.7 while 60 students representing 16.1% used VIP/KVIP, and 16.7% used covered or uncovered pit latrines. Out of the 372 students enumerated, 19 respondents had no toilet facilities in their homes.

Table 4.2.5.7 Toilet Facility used by Household

Toilet Facility	Frequency	Percent	Cumulative Percent
Flush toilet	229	61.6	61.6
Pan/bucket	2	0.5	62.1
Covered pit latrine	49	13.2	75.3
VIP/KVIP	60	16.1	91.4
Uncovered pit latrine	13	3.5	94.9
None	19	5.1	100.0
Total	372	100.0	

Source: Field data, 2013

4.2.5.8 Main Fuel used for Cooking

Table 4.2.5.8 depicts the fact that many students, thus 266 out of 372 (representing 71.5%) used gas as the main fuel for cooking in their homes. While 19.1% used charcoal and 5.1% used electricity and the 4.3% that is left used kerosene or oil, crop residue or sawdust and animal waste for cooking.

Table 4.2.5.8 Main Fuel used for Cooking

Fuel	Frequency	Percent	Cumulative Percent
Electricity	19	5.1	5.1
Gas	266	71.5	76.6
Charcoal	71	19.1	95.7
Kerosene/Oil	10	2.7	98.4
Crop residue/sawdust	4	1.1	99.5
Animal waste	2	0.5	100.0
Total	372	100.0	

Source: Field data, 2013

4.2.5.9 Main Fuel used for Lighting

Almost 88% of the respondents used electricity as their main source for lighting as Table 4.2.5.9 depicts. About 6% of the total number of respondents used kerosene or paraffin oil and the rest used gas, battery, firewood, and candles as the main fuel for lighting in their households.

Table 4.2.5.9 Main Fuel used for Lighting

	Frequency	Percent	Valid Percent	Cumulative Percent
Electricity	327	87.9	87.9	87.9
Gas	13	3.5	3.5	91.4
Battery	6	1.6	1.6	93.0
kerosene/paraffin	19	5.1	5.1	98.1
Candle	2	.5	.5	98.7
Firewood	5	1.3	1.3	100.0
Total	372	100.0	100.0	

Source: Field data, 2013

4.2.5.10 Appliances Owned by Respondents' Household

In Table 4.2.5.10 it is illustrated that as many as 347 out of the 372 respondents constituting 93.3% said they owned mobile phones. While 67.5% of the total number of respondents said they owned lap tops, 54% admitted they had personal computers in their homes. A little below half (43.3%) of the total said their households own vehicles and 152 out 372 respondents forming 40.9% have home theatres in their houses. As 26.1% of the total had access to washing machines in their homes, 20% also have generators. Finally 17.5% of the entire number of respondents and 12.9% had i – phones and i – pads respectively in their homes.

Table 4.2.5.10 Appliances Owned by Respondents' Household

	Frequency					
	Yes	No	%Yes	%No	Total	%Total
Home theater	152	216	40.9	58.1	372	100
i – Phone	65	301	17.5	80.9	372	100
i –Pad	48	318	12.9	85.5	372	100
Lap top	251	114	67.5	30.6	372	100
Personal computer	201	167	54.0	44.9	372	100
Mobile phone	347	25	93.3	6.7	372	100
Washing Machine	97	275	26.1	73.9	372	100
Vehicle	161	209	43.3	56.2	372	100
Generator	76	294	20.4	79.0	372	100

Source: Field data, 2013

4.2.6 How Respondent's Medical Expenses are Borne

This section reports on who bears the medical expenses of the respondents.

The number of respondents who bear their own medical expenses was 44 (making 11.8%) out of the 372, and this is shown in Table 4.2.6.1.

Looking at the results displayed in Table 4.2.6.1 it can be deduced that more than half (5 9.6%) of the respondents had their medical expenses being borne by their parents.

The National Health Insurance Scheme served as a source of funding for medical expenses for about 42% of the respondents as set out in Table 4.2.6.1.

Table 4.2.6.1 How Respondent's Medical Expenses are Borne

Bearer of Medical Expenses	Frequency Yes	No	% Yes	% No	Total	% Total
Self	44	328	11.8	88.2	372	100
Parent	222	150	59.7	40.3	372	100
NHIS	156	216	41.9	58.1	372	100

Source: Field data, 2013

4.2.7 Total Cost of Attending the University per Semester

Cost of attendance constituted expenses made by the student apart from tuition fees, they include transportation to and from lectures, feeding, accommodation, books, photocopies and entertainment.

It is shown in Table 4.2.7 that 29.6% spent between GH¢ 500 to GH¢ 99.99 during the semester in which the study was conducted. Almost half (47. 8%) spent less than GH¢ 500 while 22.6% used GH¢ 1,000 and over in the same semester of the study.

4.2.7 Total Cost of Attending the University per Semester

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than GH¢ 500	178	47.8	47.8	47.8
	GH¢ 500 - 999.99	110	29.6	29.6	77.4
	GH¢ 1000+	84	22.6	22.6	100.0
	Total	372	100.0	100.0	

Source: Field data, 2013

4.3 Results of Main Analysis

This section through tables and charts showed the results of the main data analysis and also description of the results.

4.3.1 Factor Analysis Results

This section gives the results of the factor analysis conducted, including the number of factors extracted and significant factors selected. The total variance explained by the chosen factors and also how the variables were represented in the various factors were also discussed.

4.3.1.1 KMO and Bartlett's Test

Since the sample adequacy test gave us a value of 0.6 as depicted in Table 4.3.1.1 it indicated that the sample was adequate for factor analysis to be conducted. Moreover, the Bartlet's test of sphericity resulting in a significant figure of 0.00 which is definitely less than 0.05, assuring us that there was adequate correlation existing among the variables and hence proceeded with the analysis.

Table 4.3.1.1 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0 .604
Bartlett's Test of Sphericity	Approx. Chi-Square	2071.898
	Df	1653
	Sig.	0.000

Source: Field data, 2013

4.3.1.2 Total Variance Explained and Number of Factors Extracted

Based on the procedure described in chapter three (Section 3.7.2.1) 57 factors were extracted from the total number of variables included in the analysis and 22 significant factors considered which explains approximately 70% of variation in the data. The first factor which is supposed to be the most important factor has a coefficient (factor loading after rotation) of about 3.8 and explains 6.6% of the variation in the data.

Table 4.3.1.2 Total Variance Explained

	Initial Eigenvalues			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.607	11.392	11.392	3.835	6.612	6.612
2	2.973	5.125	16.517	2.912	5.021	11.634
3	2.812	4.849	21.365	2.190	3.775	15.409
4	2.353	4.057	25.423	2.171	3.742	19.152
5	1.982	3.417	28.840	2.008	3.461	22.613
6	1.929	3.326	32.166	2.002	3.452	26.065
7	1.910	3.293	35.459	1.955	3.370	29.435
8	1.783	3.073	38.532	1.813	3.127	32.562
9	1.736	2.994	41.526	1.743	3.005	35.567
10	1.626	2.803	44.329	1.738	2.996	38.563
11	1.494	2.576	46.904	1.681	2.899	41.462
12	1.429	2.464	49.369	1.677	2.892	44.354
13	1.396	2.407	51.776	1.629	2.809	47.163
14	1.384	2.386	54.161	1.601	2.760	49.923
15	1.291	2.226	56.388	1.570	2.706	52.629
16	1.233	2.126	58.514	1.548	2.669	55.298
17	1.199	2.068	60.581	1.471	2.536	57.834
18	1.139	1.963	62.545	1.464	2.524	60.359
19	1.099	1.894	64.439	1.412	2.435	62.794
20	1.063	1.834	66.272	1.394	2.403	6 5.197
21	1.051	1.812	68.085	1.351	2.329	67.526
22	1.008	1.737	69.822	1.331	2.295	69.822

Source: Field data, 2013.

Figure 1 indicates the total number of extracted factors and the red line showing the cutoff point for significant factors which are greater than one. The 22 factors extracted and how the variables are related to the factors is shown in the Factor Loading Matrix in Appendix C.

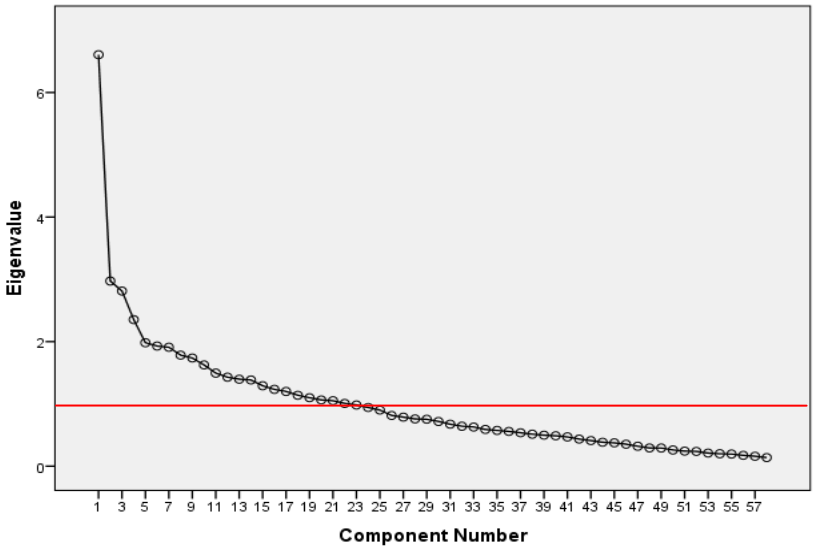

Figure 1: Scree plot for exracted factors

As already discussed in the methodology the factor scores are computed based on the factor loadings. After the factor scores were generated, the RNI for the first respondent was computed by summing up the 22 factor scores and it is as follows:

RNI = 0.99337 + (-0.31253) + 1.28278 + (-0.59269) + (-1.33686) + 0.52013 + (-1.39403)
+ (-0.69508) + 0.03033 + 0.34331 + 0.51811 + 0.74016 + (-0.24637) + 0.24085 + (-0.10567)
+ 0.88945 + (-0.34903) + 0.96427 + 0.06832 + (-0.7841) + (-0.25234) + (-0.46595)
= 0.05643

This was computed for all the 372 respondents, and the minimum RNI was -9.62008 and maximum RNI was 15.71579. Since most of the respondents had negative RNI's and the range

was too wide which would make grouping of the need levels difficult, the adjusted RNI was computed to eliminate the negative values and to norm the RNI's between 0% – 100%.

The RNI_{adj} for the first respondent was arrived at as follows:

$$RNI_{adj} = \frac{0.05643 - (-9.62008)}{15.71579 - (-9.62008)} \times 100 = 38.1929$$

This was as well computed for all the respondents and the minimum and maximum values were 0% and 100% respectively.

4.3.2 Relative Need Index Statistics

The discussion in this section involved the computation of Relative Need Index which was based on the factor scores.

After computing the Relative Need Index, the mean level of need was about 38% as can be seen in Table 4.3.2.1. Another deduction made was that, on the scale of 0% to 100% of need levels, 25% of the respondents had need levels less than 25.7% and 75% of the respondents were at need levels less than 48.6%. Figure 2 depicted positive skewness, implying that students who were not very needy were more than students who were very needy.

Table 4.3.2.1 Relative Need Index

Number of Respondents		372
Mean		37.9700
Skewness		0.830
Std. Error of Skewness		0.126
Kurtosis		0.676
Std. Error of Kurtosis		0.252
Percentiles	25	25.7462
	50	34.7791
	75	48.6474

Source: Field data, 2013

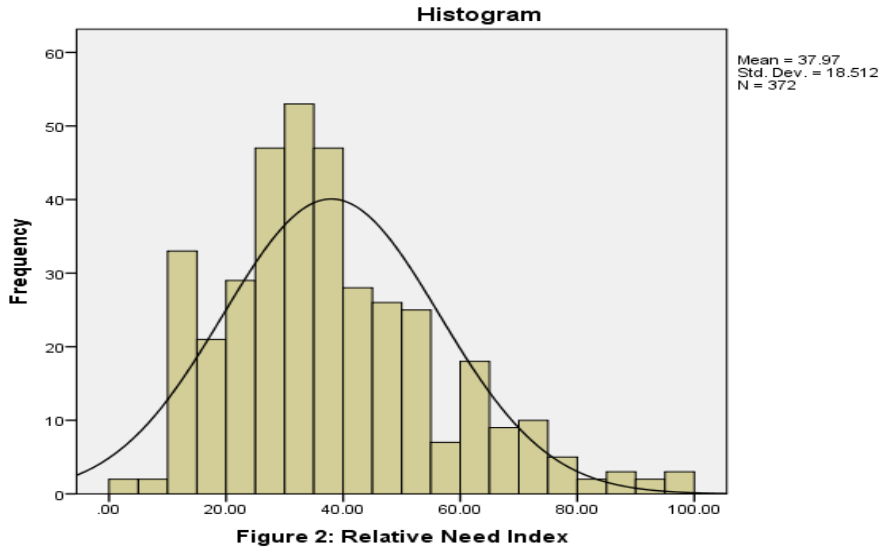

Figure 2: Relative Need Index

Source: Field data, 2013

After grouping the need levels into five categories, the mean need level reduced slightly to 3.62%. Majority (47.3%) of the people were in the less needy group, the group that had the least number of people was the most needy group which recorded 2.7% of the total number of respondents. Figure 2 shows the pictorial representation of the need groups.

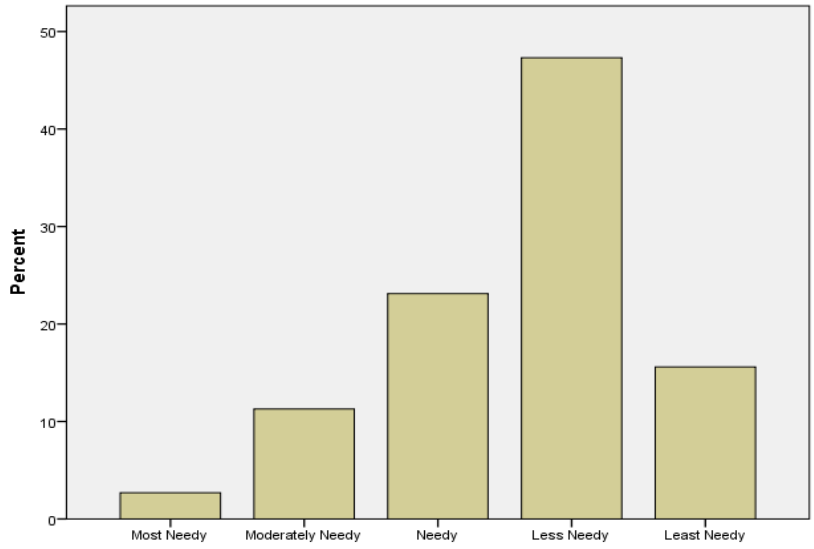

Figure 3: Relative Need Groups

4.4 Discussion of the Results

Considering the results from the demographic section it informed us that there was some sort of gender disparity in the University, therefore gender matters in awarding the scholarship. In comparing the percentages of males and females; about 72% of the respondents were males and 28% females, furthermore, during the 2012/2013 academic year, the University of Ghana students population was 35,638 which is made of 60% males and 40% females and since the establishment of SFAO 89.5% of the applicants were males while 10.5% were females. Considering the comparisons above, females were minority in all the situations discussed, especially in applying for financial aid. Hence female students must be encouraged to apply for financial assistance if they need it.

Most of the students were young people under 27 years with only a few between the ages of 27 and 32. This reflected in the employment and marital status, where an overwhelming majority was single and unemployed. This implies that most respondents were dependents and it was clear in the preliminary analysis that most of them depended

on their parents for their education and health expenses. In this vein the background of the parent is paramount in determining the need level of a student.

The age distribution was skewed towards the younger people, meaning there were many younger people than older people. About 77% of the respondents were aged below 24 years and the other 23% were 24 years and older. This trend follows some rationality because in Ghana's educational system one is expected to enroll in the university by the age of 18 years, all things being equal. Moreover, the study was centered on undergraduate students and therefore it was not expected to have many older people in the data.

It was also evident that most students who hailed from the various regions of the country were permanently residing in Accra. About half of the respondents resided in urban centers whiles less than half hailed from rural communities. This trend indicated that the region one hailed from has a little influence on where one resided, therefore the two factors must be considered. The chunk of the respondents had second class lower and it cuts across all the courses of study, the researcher attributed this to the wider range of the second class upper division. Most of the non-resident students lived with their relatives in town meaning they neither pay hostel fees nor rent.

Whiles an average number of students attended private Junior High Schools, majority of them attended public Senior High Schools because the public SHSs are many and better

in the country. Almost all of the students fell on SLTF loan as their secondary source aside the main source of funding their university education.

More fathers were employed than mothers and majority of the employed mothers were business women or traders. Considering the materials used in building their houses, facilities and amenities in their homes, a little more than half of the respondents had the facilities and amenities an average Ghanaian home possesses. There were a few people in the high socio-economic strata and the low socio-economic strata, while majority of the respondents were in the middle level socio-economic strata.

After inputting the variables obtained from the respondents the researcher had absolutely no control over how the factors were extracted. Moreover, the responses of the individual students were scored without the manipulation of the researcher and there was therefore no room for any scholarship officer to determine how the scoring of an applicant should be done.

Per the information gathered from the sample selected, majority of the students were well endowed.

Limitation

The model cannot be replicated with any other data because of the method used.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDTIONS

5.1 Summary

The principal issue expounded in this study was the development of a statistical model which would assist in assessing the financial need and awarding scholarships to the very needy among students who apply for financial aid. This model is a means testing formula used to target financial assistance to needy students. It was discovered in the research study that different countries have different means testing formulae used for allotting financial assistance to needy students.

The process entailed the collection of information on a large number of variables from a selected number of students. Based on these variables, twenty two factors were then statistically extracted and these factors constituted the indicators for determining the need of a student. These factors had weights which were greater or equal to one since the weight of a factor indicated its significance in the model. Now each variable also had a weight under a factor and the later weight signified the degree to which the factor and variables under it corresponded, implying that a variable with a very small weight (less than plus or minus 5) was not adequately represented in the factor.

Furthermore, the responses from the sampled population were scored for the 22 factors, meaning that each individual respondent had 22 scores. These computed scores were aggregated to show the need level of the respondents. The aggregate scores were now indexed from 0 to 100% resulting in the Relative Need Index, meaning that a respondent who scored 0% was not needy or was the least needy whiles the one who scored 100% was the most needy. Besides, the need levels were categorised into five distinct groups starting from most needy to least needy in order for the scholarship to be awarded in that manner.

Two award schemes were proposed by this study; the first scheme - full scholarship to those who fall in the most needy and the needy groups, half scholarship to those in the moderately needy group and then no award to those in the less needy and least needy categories. Secondly, the scholarship awards could also be graduated into parts and disbursed to applicants according to the level of their need, such that, the most needy gets the highest amount and the least needy gets the smallest amount.

The study went ahead to look at the general need levels of the entire University of Ghana students based on the result obtained from the sample. It was made evident that majority of the students fell in the middle level groups, these are the less needy category having the highest number (47.3%) of students and the needy group which had about 23.1% of the students. Moreover, 14% of the students were considered to come from poorer

backgrounds and the most needy students constituted only 2.7% out of the 14%. Finally, students who come from wealthier families formed 15.6% of the total.

It was made bare through literature during the study that means testing is the best tool for financial assistance to needy students even though it has some challenges.

5.2 Conclusions

Findings from the study gave rise to a few conclusions, it was first of all concluded that information on income, be it students own income, income of parent or guardian, or house hold income was not included in the analysis. The reason being the difficulty in soliciting such an information. This assertion was confirmed by literature that, in low and middle income countries such as China, Kenya and Chile it is difficult to obtain accurate information on income of Households (Marcucci and Johnstone, 2010) and Ghana is not exempted from this problem.

In the previous deliberations of this study, it was acknowledged that the means testing methodology was adopted by countries and institutions in order to allot financial assistance in the form of loans and scholarships efficiently. As the main aim of the means testing methodology is to assess the financial need of a student who applies for financial assistance, it has become necessary to propose it to the Student Financial Aid Office of the University of Ghana.

It came to light that countries have their own means testing formulae of which some are similar. The difference between the means testing method developed in this study and that of the other countries is that, this method selects the relevant factors statistically. In addition to that the researcher had no control over how weights were assigned to variables and also how individual responses were allotted scores. There is therefore little or no room for human errors, favouritism, etc. It was revealed during the review of related literature that most countries using the means testing methodology end up giving some financial assistance to students who come from rather affluent backgrounds. The researcher argued that this method would reduce the aforementioned problem because of its scientific nature.

5.3 Recommendations

Means testing is a very useful tool for targeting resources to the needy in society. It was realised that this method is greatly influenced by socio-economic characteristics which are not very easy to verify.

Some recommendations are listed below for possible consideration by the University; they were made to enhance the efficiency in assessing the need of applicants and awarding the scholarship accordingly.

1. First of all the method of means testing developed in this study is recommended for the University to adopt it for the award of scholarships at the Students Financial Aid Office.
2. Students must be urged to give application forms to their parents or guardians to fill their part themselves for accuracy.

3. There is a high tendency of providing false information by applicants and there is therefore the need for a strict and cost effective verification process if the model is adopted.
4. There should be sanctions and penalties put in place for applicants who provide fraudulent documents and these things must be clearly spelt out to them.
5. Since it takes time for systems to design, as discovered in the literature review, piloting and implementation of the model needs to be considered critically.

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APPENDICES

Appendix A: Results from Field Data

Table A1: Course of Study

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Science	108	29.0	30.1	30.1
	Arts	182	48.9	50.7	80.8
	Business	67	18.0	18.7	99.4
	Fine Arts	2	.5	.6	100.0
	Total	359	96.5	100.0	
Missing	System	13	3.5		
Total		372	100.0		

Source: Field data, 2013

Table A2: Class of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	First Class	44	11.8	11.8	11.8
	Second Upper	57	15.3	15.3	27.2
	Second Lower	232	62.4	62.4	89.5
	Third Class	39	10.5	10.5	100.0
	Total	372	100.0	100.0	

Source: Field data, 2013

Table A3: Gender of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	267	71.8	71.8	71.8
	Female	105	28.2	28.2	100.0
	Total	372	100.0	100.0	

Source: Field data, 2013

Table A4: Region of JHS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Western	22	5.9	6.0	6.0
	Central	20	5.4	5.5	11.5
	Greater Accra	192	51.6	52.7	64.3
	Volta	26	7.0	7.1	71.4
	Easter	35	9.4	9.6	81.0
	Ashanti	44	11.8	12.1	93.1
	Brong Ahafo	4	1.1	1.1	94.2
	Northern	11	3.0	3.0	97.3
	Upper East	8	2.2	2.2	99.5
	Upper West	2	.5	.5	100.0
	Total	364	97.8	100.0	
Missing	System	8	2.2		
Total		372	100.0		

Source: Field data, 2013

Table A5: Region of SHS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Western	8	2.2	2.2	2.2
	Central	57	15.3	15.4	17.6
	Greater Accra	112	30.1	30.3	47.8
	Volta	33	8.9	8.9	56.8
	Easter	71	19.1	19.2	75.9
	Ashanti	60	16.1	16.2	92.2
	Brong Ahafo	2	.5	.5	92.7
	Northern	11	3.0	3.0	95.7
	Upper East	12	3.2	3.2	98.9
	Upper West	4	1.1	1.1	100.0
	Total	370	99.5	100.0	
Missing	System	2	.5		
Total		372	100.0		

Source: Field data, 2013

Table A6: Bursery/Schorlarship/Fellowship as another source of funding for this academic year

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	352	94.6	94.6	94.6
	yes	20	5.4	5.4	100.0
	Total	372	100.0	100.0	

Source: Field data, 2013

Table A7: District Assembly as another Source of Funding for this Academic Year

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	367	98.7	98.7	98.7
	Yes	5	1.3	1.3	100.0
	Total	372	100.0	100.0	

Source: Field data, 2013

Table A8: Educational Fund of Traditional Area as another Source of funding for this academic year

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	366	98.4	98.4	98.4
	Yes	6	1.6	1.6	100.0
	Total	372	100.0	100.0	

Source: Field data, 2013

Table A9: Other Family Member as Another Source of Funding for this Academic Year

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	328	88.2	88.2	88.2
	Yes	44	11.8	11.8	100.0
	Total	372	100.0	100.0	

Source: Field data, 2013

Table A10: Study Leave as Another Source of Funding for Academic Year

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	367	98.7	98.7	98.7
	Yes	5	1.3	1.3	100.0
	Total	372	100.0	100.0	

Source: Field data, 2013

Table A11: Highest Qualification of Father

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Tertiary	150	40.3	40.3	40.3
	Professional	36	9.7	9.7	50.0
	Technical	18	4.8	4.8	54.8
	Voc/Comm	14	3.8	3.8	58.6
	Training College	26	7.0	7.0	65.6
	A' Level	19	5.1	5.1	70.7
	O' Level	15	4.0	4.0	74.7
	SSS	18	4.8	4.8	79.6
	Midle Sch/JSS	41	11.0	11.0	90.6
	Primary	10	2.7	2.7	93.3
	No Education	25	6.7	6.7	100.0
	Total	372	100.0	100.0	

Source: Field data, 2013

Table A12: Highest Qualification of Mother

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Business/Trader	158	42.5	51.6	51.6
	Fisherman/Farmer	36	9.7	11.8	63.4
	Teacher	31	8.3	10.1	73.5
	Public/Civil Servant	47	12.6	15.4	88.9
	Industry Person	34	9.1	11.1	100.0
	Total	306	82.3	100.0	
Missing	System	66	17.7		
Total		372	100.0		

Source: Field data, 2013

Table A13: Medical Expenses Borne by Guardian

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	333	89.5	89.5	89.5
	Yes	39	10.5	10.5	100.0
	Total	372	100.0	100.0	

Source: Field data, 2013

Table A14: How Respondent's Household Dispose of Refuse

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Collected	191	51.3	51.3	51.3
	Public dump	115	30.9	30.9	82.3
	Burned by household	47	12.6	12.6	94.9
	Buried by household	2	.5	.5	95.4
	Dump elsewhere	17	4.6	4.6	100.0
	Total	372	100.0	100.0	

Source: Field data, 2013

Table A15: Main Construction Material used for the Floor of Respondents' Dwelling

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ceramic/Marble	32	8.6	8.6	8.6
	Vinyl tiles	34	9.1	9.1	17.7
	Terrazzo	16	4.3	4.3	22.0
	Cement/concrete	271	72.8	72.8	94.9
	Burnt bricks	6	1.6	1.6	96.5
	Earth/mud/mud bricks	13	3.5	3.5	100.0
	Total	372	100.0	100.0	

Source: Field data, 2013

Table A16: Relative Need Groups

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Most Needy	10	2.7	2.7	2.7
	Moderately Needy	42	11.3	11.3	14.0
	Needy	86	23.1	23.1	37.1
	Less Needy	176	47.3	47.3	84.4
	Least Needy	58	15.6	15.6	100.0
	Total	372	100.0	100.0	

Source: Field data, 2013

Table A17: Student Financial Aid Application

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	66	17.7	17.7	17.7
	No	306	82.3	82.3	100.0
	Total	372	100.0	100.0	

Source: Field data, 2013

Table A18: Financial Aid Applicants who were Awarded

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	36	9.7	54.5	54.5
	No	30	8.1	45.5	100.0
	Total	66	17.7	100.0	
Missing	System	306	82.3		
Total		372	100.0		

Source: Field data, 2013

Table A19: Type of Scholarship Awarded

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Full Scholarship	15	4.0	41.7	41.7
	Half Scholarship	21	5.6	58.3	100.0
	Total	36	9.7	100.0	
Missing	System	336	90.3		
Total		372	100.0		

Source: Field data, 2013

Appendix B: Questionnaire

Section A: Student's Basic Information

A1. What is your course of study? ……

A2. What is your Student ID Number? ……

A3. What is your level of study? ……...

A4. What is your telephone number? ..... ….

A5. What is your CGPA (GPA for the past year of study) to the best of your knowledge? .....

A6. What region do you hail from?

1. Western 2. Central 3. Greater Accra 4.Volta 5. Eastern

6. Ashanti 7. Brong Ahafo 8. Northern 9. Upper East 10. Upper West

A7. What district do you hail from? (refer to district code) ……

A8. What locality do you hail from? 1. Regional Capital 2. Urban 3. Rural

A9. What region do you permanently reside in?

1. Western 2. Central 3. Greater Accra 4.Volta 5. Eastern

6. Ashanti 7. Brong Ahafo 8. Northern 9. Upper East 10. Upper West

A10. What district do you permanently reside in? (refer to district code)……

A11. What locality do you permanently reside in? 1. Regional Capital 2. Urban 3. Rural

Section B: Educational Profile of Student

(List all the schools where you have studied at each level)

Type of School	Name(s) of School(s)	Ownership of school		Location of school			District of school	Region of school
		Public	Private	City	Urban	Rural		
B1.1 Primary/JSS								
B1.3 SSS								
B1.4 All Post Secondary Institutions								
B1.5 Tertiary								

1. **Write names of schools**
2. **Ownership and Location of Schools, Tick as appropriate**

Section C: Cost of Studies

C1. Residential status:

1. Resident 2. Non-resident [ ]

C2. If non-resident, indicate your type of accommodation as a student

1.SNNIT Flat/Private Hostel on campus

2. Hostels in town 3. Rented private homes

4. Family/Relative in town

5.Others Specify…….

C3. On the average, how much do you spend in Ghana Cedis on the following items per month?

Item	**Amount (GH¢)**
C3.01 Residential /Housing/ Hostel	
C3.02 Transportation to and from lectures	
C3.03 Feeding	
C3.04 Thesis/Project*	
C3.05 Books	
C3.06 Photocopies	
C3.07 Entertainment	
C3.08 Field Trip/Attachment	
C3.09 Practical's	
C3.10 Dues	
C3.11 Other (Specify)	
Total	

Apply to final year students only

Section D: Financing of Education

D1. Who sponsored your pre-University Education?

Type of School	Sponsor (Choose from categories listed below and list all that apply in order of importance (e.g. 1, 4, 6, etc)
D1.1 Primary/Middle Sch/JSS	
D1.2 Secondary School	
D1.3 All Post-Sec Institutions	
D1.4Others (Specify)	

Parents	1	Bursaries	5
Guardian	2	Other family member	6
Self	3	Others (Specify)	7
Scholarship	4		

D2. State your main source of funding for your tertiary education this academic year (circle only one).

State Amount (GH¢) ……

SSNIT Students Loan	1
Bursary/Scholarship/Fellowship	2
District Assembly	3
Educational Fund of my Traditional Area	4
Yourself	5
Parent/Guardian	6
Other Family Member	7
Study Leave	8
Other (Specify)	9

D3. State all other sources of funding for your tertiary education this academic year (circle as appropriate).

State the amount (GH¢) available ……

SSNIT Students Loan	1
Bursary/Scholarship/Fellowship	2
District Assembly	3
Educational Fund of my Traditional Area	4
Yourself	5
Parent/Guardian	6
Other Family Member	7
Study Leave	8
Other (Specify)	9

D4. How do you pay your medical expenses?

Multiple response possible

1. Self 2. Parent 3. Guardian 4. Institution

5. NHIS 6. Other(s) Specify……

D5. Which of your parents is alive?

1. Father 2. Mother 3. Both 4. None

If your answer to D5 is 4, skip D6 – D10

D6. Are your parents living together?

1. Yes 2. No

D7. What is the highest qualification of your parents?

Educational Level	Father	Mother
1. Tertiary		
2. Professional		
3. Technical		
4. Voc/Comm		
5. Training College		
6. A' Level		
7. O' Level		
8. SSS		
9. Middle Sch./JSS		
10. Primary		
11. No Education		

D8. What is the employment status of your parents?

Status	Father	Mother
1. Employed		
2. Unemployed		

D9. What is the occupation of your parents?

Occupation	Father	Mother
1. Business/Trader		
2. Fisherman/Farmer		
3. Commercial Driver		
4. Teacher		
5. Lecturer		
6. Public/Civil Servant		
7. Industry Person		

D10. What is the position of your parents?

Position	Father	Mother
1. Managerial/Large Scale		
2. Middle Level/Medium		
3. Labourer/Driver/Small		

If response to question D2 is 6, answer questions E1 – E6 otherwise skip to F1.

Section E: Guardian's Information

E1. Who is your Guardian (Main Sponsor of your education)? 1. Father 2. Mother 3. Step Parent 4. Uncle/ Parent 5. Other (Specify) ……

E2. What is the marital status of your guardian?

1. Married 2. Informal 3. Separated
4. Divorced 5.Widowed 6. Never Married

E3. What is your guardian's highest Educational Qualification attained?

1.None 2. Primary 3. Middle/JSS
3. Voc/Comm. 5. O' Level 6. SSS 7. A' Level
8. Training College 9. Technical
10. Professional 11. Tertiary 12. Koranic

E4. What is your guardian's employment status?

1.Employed 2. Unemployed

E5.What is your guardian's occupation/profession?

1. Trader 2. Fisherman 3. Farmer 4. Driver
4. Teacher 6. Professional (Accountant, Doctor etc)

E6. What is your guardian's telephone number?

…….

Section F: Household Assets

F1. Does the household or a household member own the dwelling?

Own the dwelling	1
Rents the dwelling	2
Uses without paying rent	3

F2. How many rooms does this household occupy?

F3. How many hectares of land are owned by the household?

F6. Does the household own any small or medium scale business? For example a provision shop

1. Yes 2. No

F7. Does the household own any large scale business? 1. Yes 2. No

F7. Does the household have electricity?

Yes 1 No 2

F8. Does the household own any of the following? (INCLUDE ITEMS ONLY IF THEY ARE IN WORKING CONDITION)

		YES	NO	DK
i.	Electronic iron	1	2	3
ii.	Refrigerator	1	2	3
iii.	Television	1	2	3
iv.	Video deck /DVD	1	2	3
v.	Home Theater	1	2	3
vi.	i – Phone	1	2	3
vii.	i – Pad	1	2	3
viii.	Lap Top	1	2	3
ix.	Cassette player/Radio	1	2	3
x.	Stereo system	1	2	3
xi.	Personal Computer	1	2	3
xii.	Fixed Line	1	2	3
xiii.	Mobile Phone	1	2	3
xiv.	Mattress or Bed	1	2	3
xv.	Watch or Clock	1	2	3
xvi.	Sewing Machine	1	2	3
xvii.	Electronic/Gas Stove	1	2	3
xviii.	Washing Machine	1	2	3
xix.	Kerosene Stove	1	2	3
xx.	Microwave	1	2	3
xxi.	Fan	1	2	3
xxii.	Sofa	1	2	3
xxiii.	Bicycle	1	2	3
xxiv.	Motorcycle	1	2	3
xxv.	Vehicle	1	2	3
xxvi.	Generator	1	2	3
xxvii.	Canoe/Boat	1	2	3
xxviii.	Shares/Treasury Bills/Bonds	1	2	3

Section G – Household Amenities

G1.What is the material of the roof of the house?

Mud	1
Thatch	2
Wood	3
Metal sheets	4
Cement/concrete	5
Roofing tiles	6
Asbestos/Slate	7
Other (Specify)……..	8

G2. What is the material of the walls of the house?

Mud/mud bricks	1
Stone	2
Burnt bricks	3
Cement/sandcrete	4
Wood/bamboo	5
Iron sheets	6
Cardboard	7
Other (specify)……	

G3. What is the main construction material used for the floor of this dwelling?

Earth/mud/mud bricks	1
Cement/concrete	2
Stone	3
Burnt bricks	4
Wood	5
Vinyl tiles	6
Ceramic/Marble tiles	7
Terrazzo	8
Others (Specify) …….	

G4. What is the main source of drinking water?

Piped into dwelling or compound	1
Public outdoor tap	2
Borehole	3
Protected well	4
Unprotected well, rain water	5
River, lake, pond	6
Vendor or truck	7
Other (Specify)……..	

G5. What kind of toilet facility does your household use?

None	1
Flush toilet	2
Pan/bucket	3
Covered pit latrine	4
Uncovered pit latrine	5
VIP/KVIP	6
Other (Specify)……	

G6. What is the main fuel used for cooking?

Gas	1
Electricity	2
Charcoal	3
Kerosene/Oil	4
Crop residue/sawdust	6
Animal waste	7

Other (Specify)…….

G7. What is the main fuel used for lighting?

Kerosene/paraffin	1
Gas	2
Electricity	3
Generator	4
Battery	5
Candles	6
Firewood	7
Solar energy	8

Other (Specify)…….

G8.How does your household dispose of refuse?

Collected	1
Burned by household	2
Public dump	3
Dump elsewhere	4
Buried by household	5

Other (Specify)……

Section H: Socio-economic Characteristics

H1. Gender: 1. Male 2. Female

H2. Date of birth (dd/mm/yyyy): ……..

Indicate exact age in years. [ ]

H3. What is your highest educational qualification attained? 1.SHS/SSS/O' Level 2. A' Level 3. Diploma 4. Degree 5. Postgraduate 6. Training College 7. Technical/Professional 8. Other ……...

H4. Marital Status: 1. Married 2. Informal/Loose Union 3. Separated 4. Divorced 5. Widowed 6. Never Married

H5. How many children do you have? ……

H6. Ages of the children

	Ages of children						
	1	2	3	4	5	6	More than 6
Boy(s)							
Girls(s)							

H7.How many of your children do you cater for?

.....

H8. How many other dependants do you have?

……

H9. Number of children and wards currently at school

	Kindergarten	Primary/ JSS	SSS	All Post-Sec Institutions	Tertiary
Male					
Female					

H10. Employment status:

1. Employed
2. Employed on study leave without pay
3. Unemployed

H11. Personal Income (Monthly, GH¢)

Income	Ye	No	<100	100 – 249	250 – 499	500 – 999	1,000
Wages /Salary	1	2					
Interest on investmen	1	2					
Business P	1	2					
Other	1	2					

Section I: Students Financial Aid

I1. Have you ever applied for the Students Financial Aid? Yes 1 No 2

I2. If yes, were you awarded the scholarship?
Yes 1 No 2

I3. What type of scholarship were you awarded?
Full Scholarship 1 Half Scholarship 2

I4. Would you need financial aid for needy students of the University of Ghana?
Yes 1 No 2

MEMBERS OF HOUSEHOLD INCLUDING RESPONDENT

F7. **How Many People are in this Household?**

30 NAME (Please, start with the name of the household head)	31 AGE	32 SEX 1. Male 2. Female	33 RELATIONSHIP TO HEAD OF HOUSEHOLD 1. Head 2. Spouse 3. Child 4. Grandchild 5. Parent/Parent in law 6. Son/Daughter in law 7. Other relative 8. Adopted child 9. House help 10. Non-relative 11. Brother/Sister	34 EDUCATIONAL LEVEL 1. Primary 2. Middle/JSS 3. Voc/Comm. 4. 'O' Level 5. SSS 6. 'A' Level 7. Training College 8. Technical 9. Professional 10. Tertiary 11. Koranic 12. No Education	35 Names of Occupation/ Profession	36 EMPLOYMENT STATUS 1. Employed 2. Unemployed	37 SOURCES OF INCOME 1. Wages 2. Salary 3. Pension 4. Interest on investment 5. Business Profits	38 HOW MUCH DOES THE PERSON RECEIVE FROM THE SOURCE STATED IN 37 1. < 100 GH¢ 2. 100 – 299 3. 300 – 499 4. 500 – 699 5. 700 – 899 6. 900 – 1,099 7. 1,100 – 1, 299 8. 1,300 – 1,499 9. 1,500 – 1,699 10. 1,700 and more

Source: Field data, 2013

Appendix C: Factor Loading Matrix

Table C1 Factor Loading Matrix

Variables	Factors																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
X_1																		.729				
X_2					.395		.307	-.336														
X_3							-.243			-.693												
X_4		.712																				
X_5			.668						-.221													
X_6		.807																				
X_7			.796																			
X_8	.298						.321	-.211		.351								-.291				
X_9																			-.827			
X_{10}										-.695									.230			
X_{11}														.846								
X_{12}							.442						.339	.385					-.237			
X_{13}				.364									.380	.239	.251				-.203		.319	
X_{14}							-.779															

Table C2 Factor Loading Matrix

Variable	Factors																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
X_{15}													.789									
X_{16}				.559							-.323						-.218				-.233	.249
X_{17}		.324			.359												.438		.265			
X_{18}				.794																		
X_{19}																						.831
X_{20}				.710																		
X_{21}				-.224								.516	-.280		-.284					-.275	.259	
X_{22}												-.780										
X_{23}																	.757					
X_{24}			-.276										.556					.219				.220
X_{25}	.266																-.273	.604		.309		
X_{26}					.774																	
X_{27}	.327				.640																	
X_{28}					.220																.672	
X_{29}	.236						.492															

Table C3 Factor Loading Matrix

	Factors																				
Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
X_{30}	.583				-.273			-.211				-.242	.206									
X_{31}									.782													
X_{32}									.710					.337								
X_{33}	.484					.254											.330			-.228		-.224
X_{34}	.217					.814																
X_{35}						.821																
X_{36}	.518							.336		.265		.270										
X_{37}	.428					.213	.246			-.228											-.273	
X_{38}	.310						.262	.288	-.217			.353						-.317				
X_{39}	.514					.246						-.238				.307					.253	
X_{40}	0.725															.238						
X_{41}	0.801																					
X_{42}	.480									.225				-.231							-.308	
X_{43}	.205	.247	.224		.234										-.257	.299			.273		-.231	
X_{44}		.453			.348					.271				.330								

Table C4 Factor Loading Matrix

Variables	Factors																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
X_{45}	.412					.261										.305			.339			
X_{46}		.328		.210			.206	.518														
X_{47}	.293				.225		.379	.303							-.383							
X_{48}	.219	.573	.297												-.254							-.201
X_{49}		.566		-.230					.328	.237												
X_{50}								.726														
X_{51}																-.785						
X_{52}															.787							
X_{53}											.734											
X_{55}	-.254	-.249												-.234		-.421				.379		
X_{56}		.306	.618												.356		-.212	.205				

Table C5 Factor Loading Matrix

Variables	Factors																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
X_{57}																				.777		
X_{58}			.427					.246				.359				.204					-.205	

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax.

Location of Variables on Questionnaire

Variable	Section	Question number	Variable	Section	Question number
X_1	A	1	X_{16}	D	3.3
X_2	A	3	X_{17}	D	3.4
X_3	A	5	X_{18}	D	3.5
X_4	A	6	X_{19}	D	3.6
X_5	A	8	X_{20}	D	4 option 1
X_6	A	9	X_{21}	D	4 option 2
X_7	A	11	X_{22}	D	4 option 3
X_8	C	1	X_{23}	D	4 option 4
X_9	C	2	X_{24}	D	4 option 5
X_{10}	C	3	X_{25}	D	5
X_{11}	D	1.1	X_{26}	D	Father
X_{12}	D	1.2	X_{27}	D	Mother
X_{13}	D	2	X_{28}	D	Father
X_{14}	D	3.1	X_{29}	D	Mother

X_{15}	D	3.2	X_{30}	F	1
Variable	Section	Question number	Variable	Section	Question number
X_{31}	F	7	X_{46}	G	4
X_{32}	F	8i	X_{47}	G	5
X_{33}	F	8v	X_{48}	G	6
X_{34}	F	8vi	X_{49}	G	7
X_{35}	F	8vii	X_{50}	G	8
X_{36}	F	8viii	X_{51}	H	1
X_{37}	F	8xi	X_{52}	H	2
X_{38}	F	8xiii	X_{53}	H	4
X_{39}	F	8xviii	X_{54}	H	10
X_{40}	F	8xx	X_{55}	B	1.1a
X_{41}	F	8xxv	X_{56}	B	1.1b
X_{42}	F	8xxvi	X_{57}	B	1.2a
X_{43}	G	1	X_{58}	B	1.2b
X_{44}	G	2			
X_{45}	G	3			